FIRE MANAGEMENT PLAN

BIG OAKS NATIONAL WILDLIFE REFUGE
MADISON, INDIANA

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I. INTRODUCTION

The Fire Management Plan (FMP) for Big Oaks National Wildlife Refuge (NWR) has been developed to provide direction in establishing operational procedures to guide all fire management activities. This plan will assist Big Oaks NWR in achieving resource management objectives as defined in several of refuge's interim management plans.

The FMP is subject to National Environmental Policy Act/National Historic Preservation Act compliance, since other related resource management plans do not address the environmental impacts of fire management activities. All potential environmental impacts resulting from this plan will be reviewed as required by law. An environmental assessment will accompany this plan (Appendix K) and be made available to the public for review and comment. The public will also be encouraged to comment on the draft plan during the revision process.

U.S. Department of the Interior policy states that refuge lands with vegetation capable of sustaining fire will develop a fire management plan (910 DM 1). The Fish and Wildlife Service's Fire Management Handbook (621 FW 1.4-5) states that "every area with burnable vegetation must have an approved Fire Management Plan". Big Oaks NWR's FMP is a detailed program of action to implement fire management policies and objectives. Additionally, the protection of life, property, and natural resources from fire is of the highest priority.

The mission of the U.S. Fish and Wildlife Service (Service) is:

> Working with others to conserve, protect, and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people.

The mission of the National Wildlife Refuge System is:

> To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

The mission of Big Oaks National Wildlife Refuge is:

> To preserve, conserve and restore biodiversity and biological integrity for the benefit of present and future generations of Americans.

For Big Oaks NWR, the fire management program will be carefully guided by resource management objectives designed to offer the greatest protection and perpetuation of Big Oaks NWR's natural resources and their associated natural processes. Big Oaks NWR does not currently have an operational FMP. Long-term fire management planning needs to be formalized with an FMP regarding fire management practices and refuge habitat conditions. These management decisions are not adequately addressed within any existing management plans.

This FMP is governed by several related statutory authorities. These include the Clean Air Act, the Clean Water Act, the Endangered Species Act, the National Environmental Policy Act, and the Antiquities Act. The Departmental Manual (910 DM) and the Fire Management Handbook (621 FW) contain other cited statutes authorizing and providing the means for prevention, presuppression, and suppression of wildfire on or threatening lands under the jurisdiction of the National Wildlife Refuge System. For ease of reference, these Authorities are listed below.

1. Protection Act of September 20, 1992 (42 Stat. 857; 16 U.S.C. 594).

2. McSweeney-McNary Act of 1928 (45 Stat. 221; 16 U.S.C. 487).

3. Economy Act of June 30, 1932 (47 Stat. 417; 31 U.S.C. 1535).

4. Taylor Grazing Act of June 28, 1934 (48 Stat. 1269; 43 U.S.C. 315).

5. O. and C. Act of August 28, 1937 (50 Stat. 875; 43 U.S.C. 1181e).

6. National Park Service Acts as amended (67 Stat. 495; 16 U.S.C. 1b)

7. Federal Property and Administration Services Act of 1949 (40 U.S.C. 471; et seq.).

8. Reciprocal Fire Protection Act of May 27, 1955 (69 Stat. 66; 42 U.S.C. 1856a).

9. National Wildlife Refuge System Administration Act of 1966 as amended (80 Stat. 927; 16 U.S.C. 668dd through 668ee).

10. Alaska Native Claims Settlement Act of December 18, 1971 (85 Stat. 688; 43 U.S.C. 1601).

11. Disaster Relief Act of May 22, 1974 (88 Stat. 143; 42 U.S.C. 5121).

12. Federal Fire Prevention and Control Act of October 29, 1974 (88 Stat. 1535; 15 U.S.C. 2201).

13. Federal Land Policy and Management Act of 1976 (90 Stat. 2743).

14. Federal Grant and Cooperative Agreement Act of 1977 (P.L. 950224, as amended by P.L. 97-258, September 13, 1982 (96 Stat. 1003; 31 U.S.C. 6301 thru 6308)).

15. Alaska National Interest Lands Conservation Act of December 2, 1980 (94 Stat. 2371).

16. Supplemental Appropriation Act of September 10, 1982 (96 Stat. 837).

17. Wildlife Suppression Assistance Act of 1989 (P.L. 100-428, as amended by P.L. 101-11, April 7, 1989).

18. Indian Self-Determination and Education Assistance Act (PL 93-638 as amended).

19. National Indian Forest Resources Management Act (P.L. 101-630 November 28, 1990).

20. Tribal Self-Governance Act of 1994 (P.L. 103-413).

21. Department of the Interior and Related Agencies Appropriations Act (P.L. 103-32).

II COMPLIANCE WITH U.S. FISH AND WILDLIFE SERVICE POLICY

Big Oaks NWR was established on June 30, 2000, as an overlay refuge on approximately 50,000 acres north of the historic firing line of the former Jefferson Proving Ground (JPG). Through a real estate permit from the Department of the Army, the Service maintains Big Oaks NWR as habitat for endangered species, migratory birds and other wildlife in order to further the purposes of the Endangered Species Act and Migratory Bird Conservation Act.

Big Oaks NWR provides habitats for, and subsequently attracts, an abundance of wildlife species. Twenty-two species of amphibians, 17 species of reptiles, 46 species of mammals, and over 200 species of birds have been recorded or can reasonably be expected to be present on the refuge for a portion of the year.

Big Oaks NWR's primary objective is to provide habitat and protection for endangered species, migratory birds, and species of management concern (Appendix A); and to insure the availability of these resources to the American people for their enjoyment now and in the future.

Habitat management activities at Big Oaks NWR emphasize numerous goals which include; enhancement of existing wetlands, active management of grassland and shrubland areas and the protection of late second-growth forests and wooded wetlands. All of these habitat management activities are designed to benefit populations of native wildlife species.

The wide array of both resident and migratory species found on Big Oaks NWR is due to the varied habitat types found in the grassland/forest/wetland complex. The mix of forests, grasslands, forested wetlands, emergent marsh, and early successional stages of vegetation contributes to the species diversity of the wildlife community found at the refuge.

Fire is a critical ecological process in the management of early successional habitats required by many species of wildlife that are of management concern within the region. Historically, fire was an infrequent natural ecological process within the southeastern Indiana area that includes Big Oaks NWR. Fire was introduced by the Army to decrease fuel levels and lessen the chance of wildfires associated with the Army's munition testing mission prior to 1995. A by-product of the Army's management by fire has been the establishment of many large areas of early successional habitats used by many of these species of management concern within the region.

The value of the habitat within Big Oaks NWR has been recognized at both the state and national levels. Big Oaks NWR has been named a Globally Important Bird Area by the American Bird Conservancy due to large Henslow's sparrow populations within refuge's grassland areas. The Indiana Department of Natural Resources states that, "JPG is indeed a natural treasure that contains a full array of the region's natural communities and species assemblages."

III. DESCRIPTION OF REFUGE

A. Location

Big Oaks NWR is situated on approximately 50,000 acres in southeastern Indiana within Jefferson, Ripley and Jennings Counties. The refuge is about 55 miles north/northeast of Louisville, Kentucky and just north of the Ohio River (Figure 1). The nearest communities are Madison, Indiana, about 5 miles south of the southern boundary of the refuge, and Nebraska and Holton, Indiana, just north of the northern site boundary. The refuge is rectangular with the approximate dimensions of 15 miles north to south by about 6 miles east to west. Big Oaks NWR occupies land north of the firing line of the former Jefferson Proving Ground.

B. History

Army use of the site began in late 1940 with procurement of the land. Prior to purchase by the Army, this land was used for farming and grazing at levels of use similar to what can be found outside the boundaries of the property today. The Army mission at JPG was to test and evaluate all types of munitions. JPG performed this function virtually continuously until September 1994 when the last round was fired. Active use of the base by the Army ceased on 29 September 1995.
The Service began to manage the natural resources of the base on October 1, 1996 under a three-year Memorandum of Agreement (MOA) with the Army. At the end of the MOA period, the Service continued to manage all land north of the historic firing line but expanded its role to make the area a National Wildlife Refuge under a new MOA and a real estate license from the Army.

C. Climate

The area has a typical midwestern continental climate and the weather is quite variable, because of the influx of high and low pressure systems and warm moist air from the Gulf of Mexico. Summers are generally quite warm, while the winters are moderately cold (Table 1). Precipitation is fairly uniform throughout the year, averaging 3 - 4 inches per month. Spring and summer thunderstorms push the monthly average over 4 inches for the March-June period, while the fall of the year sees monthly rainfalls close to 3 inches. Measurable snowfall can be experienced throughout the November to March period, and averages about 16 inches annually.

Approximately 39 days per year see temperatures exceeding 90º Fahrenheit (F), with occasional occurrences in excess of 100º F. The record high of 105º F occurred in July 1954. Winter temperatures are mild, with occasional periods of very cold temperatures. Although temperatures less than zero are uncommon, the record low temperature in the area is -26º F occurring in January 1994. Southerly winds vary from about 6 - 10 miles per hour throughout the year, except for the months of February, March and August when the direction is from the north-northwest. Wind gusts up to 78 miles per hour have been recorded at the Louisville Station, the nearest source of long term climatologic data. The strongest gusts are normally associated with thunderstorms. The area can experience occasional severe weather, including tornadoes. Several deaths from tornadoes occurred in Madison during 1974.

D. Topography/Soils/Water

Ground elevations at Big Oaks NWR are generally between 850 - 900 feet Net Geodetic Vertical Datum, with elevations along the numerous streams flowing through the area being about 30 - 50 feet lower. Site drainage is generally to the west and southwest. The area is in the headwaters of the White and Muscatatuck River Basin, a major tributary of the Wabash River, which in turn is a major tributary of the Ohio River. Small to moderate size streams flowing through the Jefferson Proving Ground site include: Otter, Graham, Little Graham, Big and Middle Fork Creeks.

Big Oaks NWR is located in the Till Plains section of the Central Lowlands physiographic province. The topography is dominated by gently rolling hills as a result of glacial processes. The bedrock exposed in Jefferson and Ripley counties belongs to the Ordovician, Silurian, and Devonian Systems of the Paleozoic era. These rocks were deposited about 450 to 350 million years ago as fine grained sediments in shallow marine waters. The strata dip 20 - 25 feet per mile to the west. In the site area the rocks at the surface are the Silurian rocks. The Devonian bedrock is composed predominantly of limestones that exhibit karst features in some areas.

Big Oaks NWR is underlain by deep, nearly level and gently sloping, poorly drained and somewhat poorly drained soils formed in a thin mantle of loess and in the underlying glacial drift. The surface layer of the soil is generally dark grayish brown or grayish brown, mottled, silty sandy clay, to a depth of 12

inches. The subsoil layer is composed of silty sandy clay that is light gray, yellowish brown, mottled, and friable. The subsoil layer extends below a depth of 7 feet. The available water capacity of the soil is very high and the permeability is slow. There is a perched, seasonal high water table at or near the surface during the winter and spring months.

Table 1. Monthly average weather data taken at Louisville, KY National Weather Service office.

MONTH	AVG. DAILY MIN. TEMP (°F)	AVG. DAILY MAX. TEMP (°F)	AVG. MONTHLY MEAN TEMP (°F)	AVG. PRECIPITATION (in)	WIND VELOCITY (MPH)	WIND DIRECTION
January	24.1	40.8	32.5	3.2	9.6	S
February	26.8	45.0	36.0	3.2	9.6	NW
March	35.2	54.9	45.1	4.2	10.2	NW
April	45.7	67.5	56.7	4.0	9.8	SW
May	54.7	76.3	65.5	4.6	8.0	SE
June	63.3	84.0	73.8	4.1	7.4	S
July	67.5	87.6	77.5	4.1	6.8	S
August	66.0	86.7	76.5	3.4	6.5	N
September	59.2	80.6	70.0	2.9	6.8	SE
October	46.2	69.3	57.7	3.1	7.3	SE
November	36.7	55.6	46.0	3.7	8.9	S
December	28.9	45.5	37.2	3.4	9.3	S
Annual	46.2	66.0	56.1	43.8	8.3	S

E. Habitat Types

The following habitat types were derived from 1995 and 1997 aerial photos. Photo interpretation was completed in 1998. Classifications are comparable to those used in the US GAP Analysis Project. The distinction between forest and woodland is based on the amount of canopy closure. Forest areas have 60% or greater canopy closure and woodlands have 20% to 40% canopy closure.

Upland forests comprise 27,400 acres (55%) of the 50,000 acre refuge (Figure 2). The upland forest classification includes both evergreen and deciduous species ranging in age from young (~15-30 years)

to mature (≥50 years). The primary evergreen species at Big Oaks NWR is eastern red cedar (*Juniperus virginiana*). Dominant deciduous trees include sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*) and black gum (*Nyssa sylvatica*) on poorly drained upland depression sites. Tulip poplar (*Liriodendron tulipifera*) and white ash (*Fraxinus americana*) are the species making up a majority of the young upland forests on well drained sites. White oak (*Quercus alba*), red oak (*Quercus rubra*) and shagbark hickory (*Carya ovata*) are the dominant species on intermediate and within some mature upland forests. American beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*) dominate the remainder of the mature upland forests.

Our second most abundant habitat at Big Oaks NWR is grasslands. This habitat type makes up 8,400 acres (17%) of Big Oaks NWR. The dominant grassland species appears to be broomsedge (*Andropogon* sp.).

Other habitat types at Big Oaks NWR include 5,200 acres (10%) palustrine wetland, 3,000 acres (6%) woodland, 6,200 acres (12%) early successional, and less than 250 acres each of open water, and bare soil areas. Woodland species composition is comparable to that of upland forest. The palustrine wetland category includes all growth stages of palustrine vegetation including early successional and forested wetland.

F. Historical/Ecological Role of Fire

Historically, fire was a rare ecological process within the southeastern Indiana area that includes Big Oaks NWR. Fire first began to change the landscape as early settlers used fire to clear the land to establish farms. Fire was used (in combination with herbicides and mechanical disturbance) after acquisition of the property by the Army, in 1940, to decrease fuel levels and lessen the chance of wildfires associated with the Army's munition testing mission. This disturbance regime has lead to the establishment of productive grassland and other early successional habitats within Big Oaks NWR.

G. Refuge Fire History

Prescribed fires and wildland fires were an annual occurrence throughout much of the southern 3/4 of Big Oaks NWR area during active Army management. Wildland fires occurred as a direct result of munitions testing and occasionally resulted from prescribed fires. Prescribed fires were used on an almost annual basis by the Army to reduce fuel loads and lessen the chance and/or severity of wildlands fires. Due to the presence of unexploded ordnance (UXO), wildland fire suppression occurred from roadways (or off roadways within controlled access areas) using non-earth disturbing methods (i.e. water and backfires). The extent of wildland fires resulting from

munitions testing was never documented. There are no reports of wildland fires resulting in loss of life or damage to private property during the Army management of the Big Oaks NWR area.

Records documenting the extent of the Army's prescribed fires are available from 1981 to 1997. Annual prescribed fires were primarily conducted in the spring but occasional fall fires are recorded. Total area burned varied from a high of approximately 15,000 acres in 1981 to a low of 1,000 acres in 1988. Due to Army personnel constraints no burns were conducted in 1994 & 1996. Beginning in spring 1998, the Service initiated its prescribed fire program with a 4,000 acre burn. The Service continued its prescribed fire program in 1999 with a 7,400 acre burn.

H. Fire Effects

1. Vegetation and Fuels

Effects on vegetation and fuels vary depending on species, season and weather. Species of plants tend to be habitat specialists that have adapted to certain environmental conditions but many of these same plant species will tolerate a wide range of habitat conditions. Fires generally favor grasses and forbs that have adapted to disturbance and are shade intolerant. By reducing encroaching woody vegetation, fire will make available additional nutrients and available sunlight. Shade intolerant shrub species will quickly colonize a site to take advantage of the increase in nutrients, lack of competition and prevalence of sunlight. Within a fire prone or fire managed landscape, this cycle of immediate beneficial response for grasses and slightly slower beneficial response to shade intolerant shrubs, will be continuously repeated.

The quantity and moisture level of surface fuels will have an affect on the rate of spread and intensity of the fire. In general, the longer the period between burns the greater the accumulation of fuels and the greater the likelihood of a more severe fire once ignited. High intensity fires associated with drought or excessive fuel levels will tend to be stand replacing, radically replacing the present plant community with early successional, shade intolerant species. Depending on the management objectives and the original vegetation this may either be beneficial or detrimental.

Depending on the intensity of the fire, larger trees may be minimally to severely affected. Fires of low to moderate intensity can cause high mortality in susceptible species of trees. Mature trees, especially those with thick insulating bark, have better survival rates.

2. Wildlife

In general, the effects of fire on wildlife is favorable, usually creating vital habitat and species richness. A wide variety of horizontal and vertical habitat components are created, with all fire regimes except at stand replacing level fire. This type of devastating fire has significant short term adverse impacts on wildlife habitat, including direct mortality, often displacing species. Over time, the site recovers and has positive effects on wildlife, favoring early successional species.

3. Air Quality

The effects are minimal, with all but the most intense wildfires, where visual impairment or air quality are compromised over the duration of the incident. Adverse air quality associated with prescribed burning usually is minimal, as the units are burned under a developed prescription favorable for good smoke dispersal and total consumption of fuels less than 1 inch in diameter. In addition, the majority of the units burned are isolated (> 1 mile from the boundary).

4. Soils

Adverse impacts are usually minimal, except under dry conditions where soil moisture is very low and deep burning of the of the organic layer can occur. Wildland fires and prescribed fires rarely consume more than 50 percent of the duff/litter layer and rarely transfer significant amounts of heat for an extended period of time.

IV REFUGE FIRE MANAGEMENT GOALS AND OBJECTIVES

In accordance with the goals and objectives of the NWR System, Big Oaks NWR is committed to the protection of life, property and the environment, as well as perpetuating natural processes. By Service policy the primary objective of this FMP is wildland fire suppression, the use of prescribed fire for habitat and wildlife management is a secondary objective.

In all suppression activities, the presence of UXO and depleted uranium (DU) contamination must be considered. All areas of Big Oaks NWR are considered contaminated with UXO, therefore, no earth-disturbing measures may be used to control wildland fires. DU is located on the DU Impact Area currently regulated by the Nuclear Regulatory Commission License (Number Sub-1435) to the Army. Evidence suggests that DU is not readily transported in smoke associated with burning of natural vegetation in an environment similar to that occurring at the refuge (Williams et. al. 1998).

A. Fire Management Goals

The fire management goals for Big Oaks NWR are:

1. The protection of human life, both of the firefighter and the public within and adjacent to refuge lands.

2. The protection of property and natural/cultural resources within and adjacent to refuge lands.

3. Manage the use of fire to compliment or augment other means of maintaining refuge habitat to achieve identified management goals.

4. Develop and implement a process to insure the collection, analysis and application of high quality fire management information needed for sound management decisions.

5. To utilize fire for the reduction of fuels in areas of Big Oaks NWR which may pose risks to various types of resources both human and natural.

B. Fire Management Objectives

The fire management objectives for Big Oaks NWR are:

1. Protect important scientific, cultural, historic and prehistoric, and scenic resources, private lands, and visitor, administrative and other facilities/structures from wildfire.

2. Prevent unplanned human-caused ignitions.

3. Maintain a diversity of plant communities and associated wildlife species through the use of prescribed fire.

4. Utilize prescribed fire as an integral part of a management program to enhance habitat critical to the recovery of endangered, threatened, rare or special concern species as required.

5. Control and eliminate, if possible, through the use of prescribed fire, plant species considered invasive, exotic or nuisance.

6. Implement a habitat monitoring program for all prescribed burn sites. Maintain a database at the refuge with, at a minimum, the following information: date of burn; weather conditions; fire behavior; and pre and post burn photos.

7. Promote an interagency approach to managing fires on an ecosystem basis.

8. Integrate fire management with all other aspects of refuge management.

V. FIRE MANAGEMENT STRATEGIES

A. Overall Approach to Fire Management Strategies

Fire suppression will continue to be the primary objective of the fire management program. Presuppression and prevention will continue to be Big Oaks NWR's primary means of preventing the spread of wildland fires. Overall, the FMP is designed to implement a safe, cost-effective program of fire protection, fuels management and resource enhancement through management-ignited prescribed fire strategies. These strategies include:

1. Suppress all human-caused fires commensurate with the values at risk, through the use of control, contain, and confine suppression alternatives. **In all suppression activities, the presence of UXO and depleted uranium (DU) contamination must be considered.**

2. Determine specific fuel loadings in high risk areas in relationship to natural conditions and to conditions that may be determined hazardous based on values or risks. Utilize hazard reduction prescribed burns and mechanical means as treatment methods to reduce excessive fuel hazards.

3. Continue to develop and maintain inter-agency coordination to promote local, regional and national cooperation. Based on local NWR conditions, contribute firefighting resources to meet the needs at Regional and National levels.
4. Initiate a habitat improvement program through management ignited fire for the purposes of optimizing grassland habitat for the benefit of a variety of upland wildlife species, such as Henslow's sparrow.

B. General Constraints on Strategy Options

Refuge-wide constraints are primarily the result of UXO contamination. Due to the past use-history of Big Oaks NWR, UXO contamination can be encountered within any portion of the refuge. Similarly, DU contamination is located within the DU Impact Area. Due to the dangers associated with fire and fire suppression in combination with UXO and DU, the following restrictions are in place to protect the safety of any persons involved in suppression activities:

1. **Earth-disturbing fire suppression techniques may <u>never</u> be used within Big Oaks NWR unless done using armored equipment or within an area that has been cleared of UXO and DU.**

2. **All suppression must occur from established roadways, within restricted areas, or by foot within unrestricted areas.**

3. **The preferred and safest method for suppression of wildland fires, within both restricted and unrestricted areas, will be the use of fire to make a black-line along established roadways (or at the discretion of the Refuge Manager along natural features) to widen existing firebreaks as needed to prevent the spread of (<u>Contain</u> strategy) or to monitor fires to ensure confinement within (<u>Confine</u> strategy) a designated area.**

4. **Due to the possibility of heat induced detonation of UXO, a UXO hazard zone, covering all areas within 4,000 feet of open flames, will be established. Entry into this zone is considered hazardous and may only be permitted by the Refuge Manager or his designee. Entry will be allowed only after wildfire "size-up" that includes an analysis of resources threatened and risk to personnel.**

5. **No prescribed fires will be ignited between the periods of 15 April to 15 September due to the presence of Federally endangered Indiana bats within portions of many burn units.**

C. Rationale for Selection of Strategies

In most cases, the suppression of wildfires, under a confine strategy is the least costly and the most appropriate for Big Oaks NWR. In all but the most severe wildfire cases, natural and manmade features within the refuge would be sufficient to allow the use of the confine strategy. To maximize the

effectiveness of the confine strategy it is necessary that maintenance (grading and mowing) on 90 - 100 miles of roads occur on an annual basis.

Modifying fuels through prescribed fire, provides additional support of wildland fire suppression through defensible barriers and buying time for suppression forces to arrive. By reducing fuel hazards, fire intensities are lower and a fire is easier to contain in all but the most severe fire weather years. A detailed inventory to identify high fuel loads and their relationship to defendable barriers is needed. Once these areas are identified they should be evaluated for the most cost efficient disposal method in order to reduce the risk.

Habitat maintenance through the use of fire is of benefit to early successional species and promotes maximum diversity on a local scale by breaking up large continuous blocks of shade tolerant stands. The role of fire as it applies in regional habitat diversity and region-wide habitat goals should be evaluated in other management documents to ensure that fire is used to maximize these goals.

VI. FIRE MANAGEMENT UNITS (FMU's)

Big Oaks NWR is subdivided into 4-FMU's (Figure 3). There is a 1038 acre Air National Guard (ANG) range inholding consisting of 2 separate range areas and 1 historic structure. The first range (983 acres) is located adjacent to FMU's 1&2, the historic structure is located within a 5 acre area in FMU 2 and the remaining range (50 acres) is within FMU 3. These range areas and the structure are excluded from Big Oaks NWR and subsequently from this FMP. The ANG maintains firebreaks around structures within their ranges due to the frequent outbreak of fires associated with their mission. Currently, no firebreaks entirely separate the ANG range areas and the historic structure from the refuge.

The size, linear shape, differing fire management strategies and the known hazards of Big Oaks NWR were considered when evaluating overall resource management strategies, vegetation characteristics and location of major access routes to define FMU boundaries. Other criteria, such as proximity to human development, were not significant enough to further define additional FMU's.

ALL FMU'S ARE CONSIDERED CONTAMINATED WITH UXO. THE DU IMPACT AREA IS LOCATED WITHIN FMU-3 AND FMU-4. DESIGNATED RESTRICTIONS ARE TO BE FOLLOWED WHEN CONDUCTING SUPPRESSION ACTIVITIES WITHIN ANY AREA OF BIG OAKS NWR.

Fire Management Unit 1

FMU-1 is 13,000 acres and is 75% forested (Figure 4). Most structures within this FMU are located just north of K Road (south boundary of the FMU) within the ANG Range. Firebreaks maintained by the ANG are sufficient to prevent damage to structures in all but the most severe wildfires. One additional structure, a picnic shelter, is located within the refuge boundary and adjacent to Old Timbers Lake at the end of Snag Hole Point Road. Damage to this structure is considered unlikely in all but the most severe wildfire situations.

Roads and their adjacent mowed grassy areas form 75% of the boundary of this FMU. A firebreak is maintained adjacent to the perimeter fence for the remaining 25% of the boundary of this FMU. Access to the interior of most areas of this FMU is severely limited. Initial attack response times are estimated to take 2 to 2.5 hours. This FMU is the unit with the least amount of UXO contamination. This FMU is the only unit in which all suppression strategies may be allowed if the Refuge Manager believes that the resources involved necessitate the use of these strategies. Use of earth disturbing tools and equipment would still be prohibited.

Fires within this FMU are expected to exhibit relatively low intensity (flame lengths) and generally low to moderate rates of spread. Exceptions to this will be within areas of steep topography in the northwest corner of the FMU. Most fires are expected to be largely confined to the leaf litter with occasional flare-ups caused by pockets of evergreens. Roads and maintained firebreaks around the perimeter of Big Oaks NWR are sufficient to prevent the spread of all but the most severe wildfires. The potential for spread to adjacent private agriculture lands is low. Should the appropriate management response indicate that suppression is needed, the suppression strategy most appropriate for FMU-1, will usually be a Confine strategy.

Fire management objectives for this unit are:

1. The protection of human life from wildland fire.
2. The prevention of property loss or resource damage from wildland fire.
3. Confine wildfires in the FMU to the smallest size possible through the use of roads and natural features.
4. Retire existing grassland habitats and allow natural succession to convert these areas to forest habitat.
5. Maintain refuge roads as firebreaks on an annual basis and refuge boundary firebreaks on a 2 to 3 year rotation.

Fire Management Unit 2

FMU-2 is approximately 15,000 acres in size, and is located south of K Road and north of H Road (Figure 5). Roads make up the boundaries of this FMU and are maintained annually. Access to the perimeter of this FMU is excellent but access to most interior areas is severely limited. Initial attack response times are estimated to take 2 to 2.5 hours. Two storage barns (wood frame with metal siding and roofs) and one historic structure, Old Timbers Lodge (stone and timber construction with shingle roof), are located within this FMU. The 2 barns are located south of K Road, each approximately 1 mile from the respective east and the west perimeters. The historic lodge is located ½ mile south of K Road just northwest of Graham Creek within an Air National Guard inholding. Access to the lodge is a single lane road. Threat to structures within Big Oaks NWR from wildfires is considered low in all but the most extreme conditions.

Fuel types within this FMU vary from perennial grasses to mature forests and form a mosaic of habitat types within the unit. Fires of moderate intensity with moderate to high rates of spread would be expected within areas of grass and shrub habitats while low intensity fires with low to moderate rates of spread would be likely within forested areas. The potential for spread to adjacent private agriculture lands is low. Should the appropriate management response indicate that suppression is needed, the suppression strategy most appropriate for FMU-2, will usually be a Confine strategy.

Fire management objectives for this unit are:

1. The protection of human life from wildland fire.
2. The prevention of property loss or resource damage from wildland fire.
3. Confine wildfires in the FMU to the smallest size possible through the use of roads and natural features.
4. Allow existing grasslands east of Little Graham Creek to convert to forest habitat through natural succession.
5. Maintain refuge roads as firebreaks on an annual basis.

Fire Management Unit 3

This 11,000 acre FMU is bounded on the north by H Road and to the south by Big Creek and D Road (Figure 6). Perimeter roads bound the unit to the west. Access to the FMU is excellent at the north, south and west perimeters but poor along the east perimeter. Elsewhere within the unit access is considered good. Initial attack response times are estimated to take 2 to 2.5 hours. No structures exist within the FMU that would be negatively effected by fire. Several abandoned "igloos" (vegetated, earthen covered, concrete bunkers) and elevated steel observation bunkers exist within the unit but would not be affected by fire.

Fuel types within this FMU vary from grassland to forest forming a mosaic of successional habitats within the unit. Fires of moderate intensity with moderate to high rates of spread would be expected within areas of grass and shrub habitats while low intensity fires with low to moderate rates of spread would be likely within forested areas. The potential for spread to adjacent private agriculture lands is low. Should the appropriate management response indicate that suppression is needed, the suppression strategy most appropriate for FMU-2, will usually be a Confine strategy.

Fire management objectives for this unit are:

1. The protection of human life from wildland fire.
2. The prevention of property loss or resource damage from wildland fire.
3. Confine wildfires in the FMU to the smallest size possible through the use of roads and natural features.
4. Allow most existing grasslands to convert to forest habitat through natural succession with the exception being grasslands along the southern boundary of the FMU that may be maintained by prescribed fire.
5. Maintain refuge roads as firebreaks on an annual basis.

Fire Management Unit 4

This 11,000 acre FMU is bounded on the north by D Road and Big Creek and to the south by Firing Line Road (Figure 7). Perimeter roads bound the unit to the east and west. Access to the FMU is excellent at the perimeters and good elsewhere within the unit. Initial attack response times are estimated to take 2 to 2.5 hours. Structures within the FMU that could be negatively affected by fire are located along the southern boundary of this FMU and include an historic one room stone schoolhouse with a shingled roof, several concrete structures with metal or concrete roofs and one brick structure with asbestos shingles. Several abandoned "igloos" (vegetated, earthen covered, concrete bunkers) and elevated steel observation bunkers also exist within the unit but would not be affected by fire.

Fuel types within this FMU vary from grassland to forest forming a mosaic of successional habitats within the unit. The west perimeter of the unit is mostly forested with the center of the unit being comprised of mostly grassland and savannah habitats. Fires of moderate intensity with moderate to high rates of spread would be expected within areas of grass and shrub habitats while low intensity fires with low to moderate rates of spread would be likely within forested areas. The potential for spread to adjacent private agriculture lands is low. Should the appropriate management response indicate that suppression is needed, the suppression strategy most appropriate for FMU-2, will usually be a Confine strategy.

Fire management objectives for this unit are:

1. The protection of human life from wildland fire.
2. The prevention of property loss or resource damage from wildland fire.
3. Confine wildfires in the FMU to the smallest size possible through the use of roads and natural features.
4. Maintain or increase existing grassland and maintain or decrease existing woodland and early successional vegetation.
5. Maintain refuge roads as firebreaks on an annual basis.

A. Fuel model 1- Short Grass (NFDRS Models A&L)

Most areas with Fuel Model 1 are former impact fields. Due to chemical application and mechanical manipulation during Army use, these fields have remained bare for several years following cessation of use. These areas are slowly becoming dominated by grasses and forbs. FMU-1, FMU-2, and FMU-4 are where this model is most abundant. Fuel loading is generally under 4,000 lb/acre. High spread rates can be expected, but fire intensities remain low and short in duration. Most fields are small in size, under 50 acres, and will spread into another fuel type or natural barrier effectively slowing the forward rate of spread. Flame lengths may approach 4 feet with a ROS in excess of 50 chains/hour with an associated wind event. A fire in this type usually will do little resource damage.

B. Fuel Model 3- Tall Grass (NFDRS Model N).

This model applies to grasslands found in many upland fields and in similar habitats with species 1 or more meters in height, with a total load in excess of 4,000 lb/acre. This model may include cattail stands. This model is abundant in all FMU's. Dominant vegetation types include broomsedge and several species of goldenrods. This fuel model is among the most valuable wildlife habitat within Big Oaks NWR. Because amounts of this fuel type will increase with fire, the relative hazard of wildfires in this fuel model will also increase. Within most areas containing FM 3, a woody shrub component is often present thus increasing the total fuel load.

Fires in this fuel are the most intense of the grass group and display high rates of spread under the influence of wind. Windy spring or fall days with warm temps and low humidity will make this fuel type hazardous. With continuous stands of tall grass, fire will carry across standing water under sustained wind conditions. Expect an extremely fast moving fire front in access of 100 chains/hour, with flame lengths over 12 feet.

C. Fuel Model 6- Shrubs (NFDRS Model F)

All FMU's have this vegetation component to one extent or another, however it is not a dominant vegetation type. Fire typically moves through this fuel model by creeping through the litter layer with low flame heights and rates of spread. During dry conditions, and high winds, fire can move through the crowns of shrub communities with rates of spread over 100 chains/hour and 12 feet flame lengths.

D. Fuel Model 8- Hardwood/mixed (NFDRS Model H or R)

Closed to semi-closed canopy stands of hardwoods and conifer associates best represent this fuel model at Big Oaks NWR. Litter layer is compact, composed of leaves, needles and twigs.

Fires will normally exhibit low rates of spread, under 5 chains/hour, with flame lengths less than 2 feet, except when an occasional fuel concentration is encountered. Fires normally will remain on the surface, except under dry conditions where fire may burn through the duff layer which may be deep. Under severe weather conditions involving high temperatures, low relative humidity and high winds, moderate fire behavior may occur and pose fire hazards. Occasional flare-ups are then possible when fire encounters heavier fuel concentrations.

E. Fire Behavior Fuel Model 9- Hardwoods (NFDRS Model K).

The vegetation component of this fuel model is open or closed hardwood stands and mixed stands with leaf off. The litter layer often contains dead leaves which are subject to moving around under windy conditions. Scattered concentrations of dead-down woody material are greater than in Fuel Model 8 above.

Fires in this fuel type will have a higher rate of spread due to the deciduous leaf litter layer and the increased oxygen available. Under windy conditions expect spotting problems from rolling and blowing leaves. Fires will generally remain on the surface, and can be a problem in the spring, before green-up. This fuel type can also be a problem in the fall, if normal moisture is not received and an unwanted ignition source is present. Expect flame lengths in access of 2 feet with a ROS of 5 to 10 chains/hour as a rate of spread and containment problems under windy conditions.

VII. FIRE MANAGEMENT AND RESPONSIBILITIES

The suppression of wildfire is given priority over all activities except the safeguarding of human life (910 DM 1.4.ET. SEQ). It is expected that all refuge employees (with exception of administrative personnel) will be fire-trained and available to assist with emergency suppression as needed on Big Oaks NWR. Fire duty assignments will include only those duties for which each employee is qualified according to guidelines specified in the National Interagency Fire Qualification Subsystem Guide (PMS 310-1). Individuals must meet training, experience, and physical fitness requirements. Depending on fire complexity, several non-line support functions may be necessary.

A. Fire Management Team Responsibilities

Refuge Manager (RM): The RM, stationed at Muscatatuck NWR, is responsible for the full range of management duties within Big Oaks NWR including fire management activities that implement an effective fire management program. Appropriate action will be taken by the manager for fires on refuge lands. Related fire management activities include delegation of authority, approval of Agency Advisors, implementing extended initial attack organization, approval of prescribed fire operations, and entrance into any UXO hazard zone (as defined in Fire Management Strategies under General Refuge-Wide Constraints Item 4). (621 FW 1.5F)

2 - Refuge Operations Specialists (ROS): The 2-ROS's assigned to Big Oaks NWR have primary responsibility for fire program management over Big Oaks NWR (all FMU's). They direct field operations in resource protection and implement and carry out the FMP. These positions are responsible for the day to day implementation of the fire suppression program, to ensure fire readiness of unit personnel, supplies, equipment and apparatus. Either ROS may act as a Resource Advisor on extended attack or project sized wildfire, serve as prescribed burn boss on non-refuge burns, and as Initial Attack Incident Commander Type V on wildfires. The ROS also prepares Big Oaks NWR annual prescribed burn program; and is responsible for recommending to RM the scheduling and implementation of management-ignited prescribed fire needs.

2-Wildlife Biologists (WB): These positions stationed at Big Oaks NWR are responsible for maintenance of fire related equipment (pumper, pumps, tools, etc.) and maintaining an inventory of the fire cache. These positions relay information to the ROS's to determine needs for NUS or for the fire cache. The WB's also serve as a prescribed fire crew members and are responsible for operation of the slip-on pumper.

Administrative Technician (OT): Responsible for posting of firefighter time and meeting procurement needs at the local level during an on-going incident. Serves as communications link for on-going wildfires and prescribed fires. Maintains a unit log during a wildfire.

Regional Fire Management Coordinator (RFMC): Provides coordination, training planning, evaluation and technical guidance, as requested, to Big Oaks NWR. Reviews all refuge burn plans and budget requests. The RFMC will be informed of all wildfire suppression activity occurring on Big Oaks NWR. As conditions warrant, approves refuge step-up plan implementation, and may request fire personnel from Big Oaks NWR to meet suppression needs elsewhere. Similarly, they may be called upon to gather additional resources to implement the fire management program. (621 FW 1.5.E)

Fire Management Officer (FMO): The FMO, stationed at Agassiz NWR, is a shared resource for Region 3 refuges, including Big Oaks NWR. The FMO advises the RM or staff on matters relative to fire planning, fire presuppression, suppression and prescribed burning. Assists in intra-agency and interagency fire management needs. The FMO supplies technical assistance relative to fire management activities and also advises the RM on priorities, strategies and tactics to reduce adverse fire impacts. The FMO can assist with oversight and coordination of Big Oaks NWR's fire management program, including wildfires, prescribed burning, and fire related dispatch and mobilization. Can assist with matters pertaining to preparation and implementation of the FMP. Can represent Big Oaks NWR and coordinate fire related activities with: other refuges, regional fire coordinator, and local, state and other federal fire organizations as directed by the RM. Maintains training and qualification records for refuge personnel; coordinates refuge fire training; maintains fire records and systems; assists developing and implementing fuel management and prescribed fire projects; coordinates mobilization of refuge resources for off-refuge assignments.(621 FW 1.5.G)

B. Refuge Fire Management Team

The Big Oaks NWR fire management team consists of the individuals listed above, assigned under the supervision of the RM. Big Oaks NWR staff members will change periodically, as do individual fire qualifications, we have attempted to list individuals by name, position and qualifications in this section (Table 2). However, this information will change periodically and the most up-to-date information will be found in the mobilization directories prepared on an annual basis.

Table 2. Big Oaks National Wildlife Refuge fire qualified staff.

Employee	Position	Qualification	Physical Fitness Level
Joe Robb	Refuge Operations Specialist	Firefighter 2 RXB3 Trainee	Moderate
Steve Miller	Refuge Operations Specialist	Firefighter 2 RXB3 Trainee	Arduous
Jason Lewis	Wildlife Biologist	Firefighter 2	Moderate
Teresa Vanosdol-Lewis	Wildlife Biologist	Firefighter 2	Moderate
Linda Gordon	Administrative Technician		

The current refuge staff is qualified to conduct prescribed burns of low complexity. Personnel and resources on hand are insufficient to plan and conduct more complex prescribed burns and suppress wildland fires following initial attack. Additional staff needed to fully implement this Fire Management Plan are described in Table 3.

Table 3. Big Oaks National Wildlife Refuge additional staff needs for fire management.

Position	Pay Grade	Status
Prescribed Fire Specialist	GS 7/9	Permanent Full-Time
Fire Program Technician	GS 7	Permanent Full-Time
Firefighter	GS 6	Temporary (7 pay periods)
Firefighter	GS 4	Temporary (7 pay periods)
Firefighter	GS 4	Temporary (7 pay periods)

C. Prescribed Fire Validation

The FMO at Agassiz NWR, working with the ROS at Big Oaks NWR, advises the RM on issues pertaining to prescribed fire validation. This allows the RM to confirm that burns will be within prescription and make appropriate decisions on the daily application of prescribed fire as appropriate.

D. Interagency Coordination.

Big Oaks NWR currently has a small number of fire qualified individuals and a minimum base of equipment for suppression activities. The refuge depends heavily on other agencies for suppression activities, especially with wildfire incidents stretching beyond initial attack to an extended attack situation.

Big Oaks NWR has signed a Cooperative Fire Agreement with the New Marion Fire Department (Appendix B). For a per response payment, their equipment and manpower are available to support refuge fire personnel. This agreement is updated by the Regional FMO by April 1 of each year. Currently there is no Agreement between the Service and the State of Indiana. The Zone FMO is working with Indiana to develop a blanket Agreement for all refuges in Indiana. Generally this should not a problem, given the low wildland fire occurrence the property has experienced in the past under Army management. Most fire suppression resources at the local and State levels are very supportive and willing partners for wildland and prescribed fire needs.

Additional Service resources are located at Muscatatuck NWR. Consult the Zone FMO when considering additional support through neighboring agencies and refuges. If these organizations fail to meet fire suppression needs, then resource requests can be made through the Zone FMO working in consultation with the RFMC to the national level.

VIII. WILDFIRE PROGRAM

This section covers the actual implementation of this action plan. It explains the method to achieve the plan objectives, relative to wildland fire. Tables showing NUS needs is found in Appendix C.

A. Fire Prevention

Person-caused wildfires result in major expenditures of fire suppression funds and will usually cause unacceptable resource damage. Prevention efforts will be directed toward reducing fire occurrence from these causes.

Big Oaks NWR will not undertake it's own specific fire prevention program but will utilize existing fire prevention programs for the state and direct refuge neighbors to those sources for additional information.

Big Oaks NWR will also conduct a Fire Prevention Analysis that identifies the hazards, risks and values of the refuge. Prevention efforts for Big Oaks NWR will be guided by the Fire Prevention Analysis. Those areas identified has having the greatest hazards and risks shall be considered for some method of fuels management to reduce the hazards. This may include management ignited fires and construction/maintenance of fuel breaks.

B. Fire Season

Wildfires can potentially start during all months of the year, however, the late November through late February period has the lowest incidence of wildfire starts. The mid-March through mid-November period is the historic fire season for this area of Indiana. During early spring, snow cover is rare, fine fuels (grasses, forbs and cattail) are cured, and cool, dry windy conditions are common. Fires at this time are normally faster spreading and human caused. Summer fires, resulting from prolonged drought conditions, may approach the rate of spread of spring fires but are normally shorter in duration. Normal summer and fall weather patterns are not conducive to wildfire spread since the prevalence of green vegetation reduces the likelihood of ignition and greatly reduces the rate of spread.

For Big Oaks NWR there is a split fire season. First, the fire season runs from snow melt, to vegetative green-up. This corresponds to a fire season beginning as early as February 15 to about May 1. Fire danger then drops to Low/Moderate levels throughout the summer months, due to broad leaf shading, high humidity and transpiration rates associated with hardwood species. Precipitation remains fairly uniform throughout the year, with a monthly average of about 3 - 4 inches. In the fall, a late fire season is possible, once deciduous vegetation has cured and leaves are on the ground. This increased litter layer is highly available as it is very loose, fluffy and dried out when denied normal moisture.

In recent drought years, fires have occurred in September and October and continued through the fall, until adequate moisture is received. Fires in the spring and fall usually pose little resource damage and are fairly easy to suppress. However, under accumulated drought conditions, fires can be very severe in late summer and early fall, when soil moisture is low. All size classes of down woody fuel are available as well as a deep litter layer.

C. Presuppression

This section describes the tasks that are completed in advance of fire occurrence to ensure an effective response and action in the event of a wildfire.

1. Training

Fire training emphasis will be to maintain fully qualified individuals at Big Oaks NWR to meet the objectives of this plan. Additional employee development training will be a second priority, depending on budget limitations and refuge and regional needs. At Big Oaks NWR level, the FMO will oversee and recommend individual fire training needs, ensure course prerequisite requirements are met, and assist individuals in scheduling training. The FMO then submits training requests to the RFMC for approval and funding, based on regional priorities and needs. To reduce training costs, attempts will be made to take advantage of training programs offered locally, through other refuges, and agencies.

Red Card qualification information, such as training records and fire assignments, are maintained through the Fire Management Information System (FMIS), which is a FWS computer database system. Information will be updated annually by the RFMC, as submitted through the FMO after verification. The FMO will maintain a file on refuge personnel; Big Oaks NWR should document the training an individual receives in their personnel file with a copy of the course completion certificate placed within the individual's file.

2. Annual fire readiness needs

The wildfire and prescribed fire season for Big Oaks NWR begins in February and ends for the most part in November. The FMO will keep the RM advised as to the need for readiness above the normal level described below. He also will advise on pre or post fire season readiness needs.

The ROS shall have fire equipment, supplies, and personnel readied and available by March 1. This includes the following:

a. Slip-on units are fully functional. The engine is outfitted to a type VI standard. Reference Fireline Handbook, p. A-27.

b. The fire cache and NUS are adequately supplied, at levels specified within the Fire Management Handbook (3.1-8 to 3.1-11). Maintain a well organized and clean fire cache throughout the fire season.

c. All fire employees meet minimum training and fitness guidelines as detailed in the Fire Management Handbook (621 FW 1.5-6 to 1.5-18).

d. All fire employees will have all initial attack gear and personal protection gear available on a daily basis.

e. All chainsaws are functional and available.

f. Handtools are adequately maintained and safe to use.

g. The RM, with input from the ROS will review all fuel break needs. This includes scheduling the maintenance of existing roads and firebreaks.

h. The ROS will insure that the Annual Prescribed Burn Plan is completed and approved by January 15 of each year. This will allow for maximizing the number of burn days available based on prescription limits set forth in the Plan.

3. Fire Detection

As potential fire danger increases, Big Oaks NWR will place added emphasis on periodic patrols as part of normal operating procedures.

4. Regional and National Concerns

Regional preparedness levels tend to follow the national preparedness level unless the central U.S. is experiencing very dry conditions and high potential for wildfire. Normal refuge operations will occur through Preparedness Level III. At Preparedness Level IV, Big Oaks NWR will seek approval through the RFMC prior to igniting any prescribed burns. At Preparedness Level V, no prescribed burns are permitted.

Subject to RM approval, fire trained individuals will be made available for regional and national needs, especially when the National Preparedness Level is at Level V.

D. Emergency Presuppression

During periods of extreme or unusual fire danger, emergency presuppression activities should be initiated to provide additional coverage and protection. Appropriate activities for emergency presuppression funds include extended tour-of-duty for refuge firefighting personnel, authorizing

overtime or premium pay beyond regularly scheduled hours, extending types and tours of detection, and prepositioning resources. The RFMC will make the final determination and if appropriate, open an emergency account authorizing the expenditure of emergency presuppression funds. A generalized Step-Up Plan for Big Oaks NWR is included as Appendix D.

E. Fire Detection

Because of small staff size and limited resources, Big Oaks NWR depends heavily upon visitors, Air National Guard and the U.S. Army Site Management Team to assist in early detection and reporting of refuge fires. As potential fire danger increases, Big Oaks NWR will place added emphasis on periodic patrols and monitoring as part of normal operating procedures.

F. Pre-attack Plan

Since there is currently a low wildfire occurrence associated with Big Oaks NWR, the RM will determine the need for a Pre-attack Plan on an annual basis. Should severe fire environmental conditions necessitate the need, a simple, informative plan will be prepared addressing the elements listed in the Fire Management Handbook (exhibit 1.4.2). Once developed, the Pre-attack Plan will be appended to Big Oaks NWR FMP.

G. Fire Suppression

The goal of fire suppression at Big Oaks NWR is to suppress all human-caused wildfires at minimum cost, consistent with the values at risk, while minimizing the adverse impacts resulting from suppression activities. Additional refuge suppression objectives include:

1. Protect human life, including all fire management personnel involved in suppression operations.

2. The protection of refuge structures, facilities, and improvements.

3. The protection of property and the environment adjacent to Big Oaks NWR.

4. The protection of all Threatened/Endangered species, natural, and cultural resources.

For most wildland fires the appropriate management response will be a suppression action. Numerous situations exist where suppression will be needed and desired. Examples of these situations include:

1. The Fire Situation shows that, regardless of the fire location, it is human-caused.

2. The Initial GO/NO-GO decision indicates that managing the fire for resource benefits is not within described limits or capabilities at this time.

The appropriate management response is not a replacement term for prescribed natural fire, or the suppression strategies of control, contain, confine, limited or modified, but it is a concept that offers managers a full spectrum of responses. It is based on objectives, environmental and fuel conditions, constraints, safety and ability to accomplish objectives. It includes wildland fire suppression at all levels, including aggressive initial attack. Use of this concept dispels the interpretation that there is only one way to respond to each set of circumstances (Fire Management Handbook 3.2-3).

Wildland Fire Situation Analysis (WFSA) (Appendix E) will be completed when fire spread and behavior exceed suppression efforts, when management capability is inadequate to accomplish wildland fire use objectives, or when prescribed fire plans are no longer adequate to guide full implementation (Fire Management Handbook 1.1-6 to 1.1-8). The WFSA will be updated daily or when strategic changes warrant. The original WFSA will be approved by the RM. Included in Appendix F is a sample Delegation of Authority to insure a smooth transition from an extended attack to a Type II or I incident or project fire.

Generally, at Big Oaks NWR, most wildfires will use confine or contain as the suppression strategy. The WFSA will consist of alternatives based on the management response and appropriate suppression strategy. The three suppression strategies are listed in order of increasing intensity of tactical action:

1. Confine - To restrict the wildfire within determined boundaries, established either prior to or during the fire. These identified boundaries will confine the fire with no direct action being taken to extinguish the fire.

   Tactics include, but are not limited to indirect human-made lines, burning out or backfiring, holding at natural barriers, cold trailing, hose lays and aerial delivery of water or retardant, perimeter mop-up and patrol. This strategy may have the least impact from suppression operations but generally involves larger areas and longer incident duration than containment and control.

2. Contain - To restrict a wildfire to a defined area using a combination of natural and constructed barriers that will stop the spread of the fire under the prevailing and forecasted weather conditions until it is out.

   Tactics include, but are not limited to direct and indirect line construction, burning out or backfiring, holding at natural barriers, cold trailing, hose lays and aerial delivery of water or retardant, perimeter mop-up and patrol. This strategy utilizes natural barriers to the greatest extent, minimizing suppression impacts from line construction. Areas are generally smaller, incident duration reduced and perimeter secured more quickly as compared with the confinement strategy. Suppression costs will be higher and additional resources will be required to meet tactical needs.

3. Control - To aggressively fight a wildfire through the skillful use of personnel, equipment, and aircraft to establish firelines around a fire, halt the fire's spread, and extinguish all hot spots until the fire is completely out. This strategy is an effective technique to achieve prompt control of a wildfire.

   Tactics are directed at total suppression of the fire as quickly as possible, usually through aggressive direct attack designed to minimize the fire size or area involved. Negative resource impacts are potentially the greatest due to the direct tactical control measures employed.

1. Considerations and Constraints

The assigned Incident Commander will determine the appropriate management response, suppression strategy and resulting tactics based on, but not limited to values at risk, current and expected weather conditions, current and expected fire behavior, available resources, threats to refuge and non-refuge resources, season of year, and firefighter safety.

All fires that are not management ignited prescribed fires are wildfires. Should management ignited prescribed fires fall out of prescription, they may then be considered a wildfire, and appropriate suppression action will be undertaken.

Indirect tactical methods may be used in all suppression strategies. The suppression methods employed will be those that cause the least resource damage (minimal tool concept) based on the values at risk. Chainsaws, portable pumps, and other small, portable equipment may be used in all FMU's outside of designated closed areas. Vehicles may be used inside Big Oaks

NWR where roads exist and are identified for public use. The use of heavy equipment (such as bulldozers) is not permitted in any FMU without written consent of the RM.

The Incident Command System will be implemented in all refuge fire management operations. Only personnel who meet the qualifications (training, experience, and physical fitness requirements) of assigned positions will be permitted to participate in fire management activities.

2. Initial Attack

Initial action will be rapid and efficient for all wildfires within or threatening Big Oaks NWR. First response will usually consist of two or three firefighters and Big Oaks NWR's initial attack slip-on pump unit. If suppression strategies other than those identified for the FMU's are utilized, the rationale for using the other strategy will be documented on the WFSA (Appendix E) and DI-1202 Fire Report (Appendix G) by the Incident Commander (IC) Type 5 (T5).

The ICT5 is responsible for the fire until relieved or until the fire is declared out. As a minimum guideline, a wildfire can usually be declared out 24 hours after the last smoke has been extinguished. If initial actions are not successful during the first operational or burning period, or at any point the IC determines that the incident requires a more complex organization, the fire will be reassessed by the assigned ICT5, RM, and the RFMC.

3. Extended Attack

Any fire which is not contained or controlled, usually by the end of the first operational period, is considered an extended attack fire. This designation will continue until the fire is declared out. A WFSA will be prepared and updated daily until such time as the incident is contained or controlled. If the fire complexity reaches a point requiring multiple resources, an IC Type III (ICT3) will be assigned after consultation with the RFMC.

As the fire complexity increases, the RM will approve requests to mobilize a local or national incident management team (Type II or I). The RFMC will coordinate the transition to an incident management team with the RM. The RM will represent Big Oaks NWR at the initial meeting, issue the delegation of authority, approve the WFSA,

and approve the Agency Advisor to the team. The RM will also perform the close-out and evaluation of the team.

An ICS-209, Incident Status Report (Appendix H), will be completed daily for extended attack incidents greater than 100 acres in size. The IC is responsible for report completion. The ICS-209 will be sent to the RFMC for transmittal to the Eastern Area Coordination Center, Minneapolis, MN.

4. Dispatch/Mobilization

The RM will designate the Initial Attack Incident Commander (ICIA), brief the ICIA on what fire information (size-up) is available, ensure an efficient get-away time, and inform the RFMC of the incident. If additional resources (reinforcements) are necessary, then the first choice will be the New Marion Volunteer Fire Department. Additional FWS support can be considered, keeping in mind the travel time required to get to the fire location. Resource needs beyond this level will be requested through the RFMC.

The following information will be included in the size-up:

Name (person reporting fire)

Location (general and legal description)

Cause

Estimated size

Discovery: date, time, by who or type

Initial attack: date, time, and type

Topography

Position of fire on slope

Fire behavior (smothering, creeping, running, torching)

Rate of spread (slow, moderate, fast)

Weather conditions: wind speed and direction

Smoke: color, amount (light, moderate, heavy)

Other considerations: access points, water source, fuel

Resource requests

Upon receiving a report of fire, get as much of the above information as possible. Dispatch information and procedures can be found in Appendix I.

5. Minimum Impact Suppression Guidelines

Suppression efforts can sometimes cause more resource damage than the actual fire. Efforts to minimize resource damage must be a consideration with all suppression actions. The assigned IC will evaluate the suppression resource needs, seek alternatives to mechanized equipment that limit soil movement, maintain natural water courses, and minimize resource degradation, while minimizing the threat to human life and property. The IC will seek RM approval prior to the use of any heavy equipment or retardant within any FMU.

It is the responsibility of the IC to establish the minimum impact suppression tactics to protect natural and cultural resources. All personnel involved with fire management are expected to have an understanding of minimum impact suppression tactics such as indirect or parallel attack (instead of direct attack), utilization of existing barriers for control lines, and cold trailing.

A Resource Advisor will be used on any fire that has the potential for significant resource damage caused by suppression operations or whenever the IC requests the position. The Resource Advisor should be an employee with resource management knowledge to advise the Incident Management Team on issues related to mitigating the effects of suppression operations on cultural and natural resources. The Resource Advisor will also assist in developing and implementing the Rehabilitation Plan for the incident.

6. Rehabilitation

Rehabilitation is any action taken to restore an area to the pre-burn or natural condition. Incident Commanders are responsible for short-term (less than six months) actions to mitigate the effects of fire suppression activities. Immediate rehabilitation actions will be outlined in the Incident Action Plan. Post-incident rehabilitation actions will be documented in a Rehabilitation Plan approved by the RFMC.

In the event of a large fire, a Resource Advisor will be designated to develop the Rehabilitation Plan. The Plan will be approved by the RM and implemented by the Incident Commander prior to the release of personnel from the fire. The Rehabilitation Plan will establish counter measures and outline methods to minimize or restore damage.

Once a fire is out, efforts will be made to return the fire site to as natural a state as possible. Generally, most initial attack fires will not have rehabilitation needs. However, each incident will be evaluated individually.

Rehabilitation (when necessary) will occur according to the following standards and techniques:

a. Remove all trash and debris from firelines, staging areas, Incident Command Posts, and other locations. Attempt to return such areas back to their original condition.

b. Flush cut all stumps that were created or disturbed on the incident.

c. Mechanically constructed firelines should be built with water bars (when necessary) to prevent erosion. Consideration should be given to moving woody debris back into firelines and reseeding with native grasses to simulate natural processes and accelerate healing of the disturbed site.

. Disturbed natural water channels will be restored to pre-burn conditions by removing and rehabilitating all constructed dams, water drafting sites, and equipment/personnel access points.

. During mop-up operations use cold trailing techniques and/or water or foam. Limit the use of control techniques that require soil disturbance and take all necessary measures to prevent concentrated foam from directly entering water sources.

7. Records and Reports

Each incident will be documented on an Individual Fire Report (DI-1202) (Appendix G). This includes all fires within refuge boundaries and fires threatening NWR System lands (see Fire Management Handbook 1.6-6). In addition, the Incident Commander is responsible for conducting an initial investigation and documenting whether the fire was human-caused or from natural agents. When investigation indicates the fire was caused by arson, evidence (including the point of origin) will be protected and the proper local and/or state law enforcement agencies will be notified.

Incident Commanders are responsible for completing the DI-1202 and forwarding a copy to the FMO. The FMO will assign refuge fire numbers, the suppression account number, and input the report information into the FMIS.

All wildfires escaping initial response action will require the completion of an WFSA to determine the next appropriate suppression response. In addition, all large fires (greater than

100 acres) will have form ICS 209 (Incident Status Summary Report) (Appendix H) submitted daily until the incident is controlled.

A documentation package will be assembled for each fire to include:

1. Unit logs.
2. Map of the fire area (7.5 min. quad. showing point of origin).
3. Dispatch log and telephone log.
4. Aircraft documentation.
5. Resource orders.
6. Incident Actions Plans.
7. Photographs, slides, videos.
8. Press clippings.
9. Accident reports.
10. Performance ratings.
11. Other documents pertinent to each individual fire.

Fire related reports and documents will be maintained at refuge headquarters. Other reports that should be kept on file include fire training schedules, qualification reports, weather data, situation reports, and prescribed burn plans.

IX MANAGEMENT IGNITED PRESCRIBED FIRE PROGRAM

At Big Oaks NWR, fire is proposed to be used as a tool to achieve specific resource management objectives. These objectives include enhancing wildlife and plant species populations, preserving endangered species habitats, promoting biological diversity, reducing hazardous fuels, and accomplishing basic maintenance needs such as disposal of vegetative waste and debris. This Management Ignited Prescribed Fire Program is designed to retain fire as a vital ecosystem process to control undesirable vegetation, to release soil nutrients, and to improve vigor of desirable vegetation.

A. Long-term Prescribed Burn Program

Big Oaks NWR was established primarily to benefit nongame grassland and forest birds. Much of the habitat management work implemented at Big Oaks NWR benefits a wide array of wildlife species. Current management activities support several landscape elements to promote maximum vegetation and

wildlife species diversity. Management practices also protect sensitive cyclic processes necessary to maintain the various ecosystems on Big Oaks NWR.

Big Oaks NWR's various habitat management plans are implemented to meet the habitat requirements of several different wildlife species. Prescribed fire has been used as a management tool on an almost annual basis for the last 20 years. The exclusion of fire from Big Oaks NWR would result in extensive deterioration of grasslands and the invasion of woody species and undesirable perennials.

Prescribed fire will be used to suppress woody shrub invasion within open grass fields. These fields, if not kept open by manipulation, will progress to more advanced stages of succession, eliminating habitat diversity. In addition, dead and down ground fuels accumulate quickly over time due to rapid vegetation growth. The use of management ignited prescribed fire on a continuing annual basis will help to maintain fuel hazards at an acceptable level where resource values at risk are high.

B. Description of Management Ignited Prescribed Burn Program

In general, the prescribed burn program at Big Oaks NWR is aimed at habitat maintenance, focusing on preventing shrub and tree encroachment in grass fields. Other burning is fuel reduction related, in high risk areas and where woody debris has been piled. Objectives include:

1. Maintain grasslands through prescribed burning to control hardwood shrub and tree encroachment.

2. Provide nesting habitat for grassland and early successional dependent species including Henslow's sparrows.

3. Reduce the dominance of invasive exotic plant species.

4. Reduce hazard fuel concentrations to prevent or reduce the severity of wildfires.

Annual activities required to prepare for and implement the prescribed burn program at Big Oaks NWR include the following:

1. Planning starts several months to one year in advance of the burn program implementation. Generally, old fields will be burned on a repeated basis, every three to four years.

2. Once all areas for burning are identified, they are priority ranked and the time of year for burning is determined. In general, light fuel units, such as grass fields, are scheduled for spring burning prior to green-up.

3. Collect and compile base line information, prepare, and submit the Prescribed Burn Plan by January 1 for necessary approvals.

4. Prescribed burning qualifications are reviewed in the fall, matching available training courses to agency and personnel needs. Training requests are submitted to the RFMC for further consideration and scheduling. At the refuge level, most of the burning is of low complexity, requiring minimal fire qualifications of Firefighter 2 rating. At least one individual, who meets the qualifications for Prescribed Fire Burn Boss (RXB3), is required to function as the Burn Boss. A minimum crew of 3 to 5 individuals have been sufficient to carry out the prescribed burn program at Big Oaks NWR in the past.

5. Implement the Prescribed Burn Program as approved by the RFMC.

6. Conduct monitoring and evaluation and complete reporting requirements following completion of all prescribed burning activities.

C. Fire Management Unit (FMU) Correlation

Management ignited prescribed fire may occur within any FMU. Management plans currently being developed call for the elimination of Prescribed Fire, for grassland management purposes, within FMU 1 and FMU 3 but Prescribed Fires may occur to meet other management objectives within all 4 FMU's (Figure 8). Detailed location maps will be included in the Prescribed Burn Plan.

D. Correlation with Fire Strategies and Objectives

The Management Ignited Prescribed Fire Program is consistent with refuge resource management objectives. In addition, wildfire strategies are enhanced through the treatment of natural and management generated fuel loads which might pose a threat to resource values.

A normal fire season at Big Oaks NWR also offers the optimum burning conditions for implementation of a prescribed burn program. Most burning will be accomplished in the spring. After green-up, debris burning could carry into the summer months, as conditions permit. Opportunities for fall burning are normally limited due to poor burning conditions. However, since "burning windows" are fairly limited at any time of the year, we will develop spring and fall prescriptions for certain units to allow for maximum opportunity to best achieve program objectives.

E. Resources Necessary to Plan/Execute/Evaluate Prescribed Burn Program

Most prescribed burning at Big Oaks NWR is of low to moderate complexity. Fire qualified individuals previously identified are supplemented with other fire-qualified individuals in order to plan, execute, and evaluate the burn program. Usually a burn crew, composed of a qualified Burn Boss and three to six additional qualified individuals will be sufficient to minimally meet most burn program objectives. For a more complex burn, a Burn Boss and additional qualified personnel will be brought in to oversee that burn.

The ROS at Big Oaks NWR is responsible for planning, executing, and evaluation of the refuge prescribed burn program. The RFMC or designee will supply the technical expertise to support the burn program and ensure that the proper burn plan implementation procedures are followed. More specific evaluation criteria are addressed within the Prescribed Burn Plan.

F. Procedures Required for Prescribed Fire Implementation

As of the writing of the FMP, the only permit required is an annual Open Burning Permit, obtained from the Indiana Department of Environmental Management (IDEM). The permit specifies the type of burn being conducted, responsible individual, and type of holding resources on site. Careful monitoring of changing state regulations is necessary to ensure any open burning is done in compliance with existing or future regulations.

All prescribed burning restrictions or notifications imposed at the state, Regional, or National level, as determined by Preparedness Level, will be adhered to.

Site preparation needs are specified within the Prescribed Burn Plan. These will be completed prior to ignition and approved by the RM. The Burn Boss or the RM may impose additional site preparation needs or request additional holding requirements based on potential risks involved.

The ROS at Big Oaks NWR is responsible for all suppression equipment and personnel. These resources are also used for implementing the prescribed burn program. All equipment and personnel are generally fire ready by January 15. No prescribed burning is to occur when a wildfire is in progress within the boundary of Big Oaks NWR.

G. Required Monitoring

All burning done at Big Oaks NWR will be well documented and is expected to be representative of other prescribed burns documented within the Fire Effects Information System (FEIS). Monitoring to determine habitat response will employ photopoints and aerial photography to aid in determining burn objective and resource objective accomplishment.

No special equipment is necessary for monitoring fire behavior. Most burns will be of low to moderate intensity and easily measured through rate of spread and flame length observations. Should more comprehensive fire behavior and effects information be necessary it will be documented within the Prescribed Burn Plan.

H. Prescribed Fire Program Complexity

The Prescribed Fire Complexity Analysis (Fire Management Handbook 2.2-3 to 2.2-9) will be used to determine prescribed fire complexity for the various units burned annually and included in the Prescribed Burn Plan. The complexity elements are assigned a complexity score of 0, 1, 3, 5, 7, or 9 and a standard weighting factor (multiplier) (Table 4) is applied to the complexity score to give a total weighted value.

The weighted rating is categorized as low, normal, or complex based on the potential risk, potential consequence, and technical difficulty of each element. This in turn helps to establish the degree of difficulty that is involved in completing the burn and determines if current refuge resources can accomplish the planned burn and the degree of training required by the burn boss. Before the fire is ignited, a GO/NO GO Checklist must be completed. A sample can be found in Appendix J.

Table 4. Complexity analysis.

	Rating	Multiplier	Weighted Value
Potential for Escape		10	
Values at Risk		10	
Fuels/Fire Behavior		6	
Fire Duration		7	
Air Quality		7	
Ignition Methods		3	
Management Team Size		3	
Treatment Objectives		5	
Total Weighted Complexity Rating		=	

Low Structure	**50 - 115 Total Weighted Value Points**
Normal Structure	**116 - 280 Total Weighted Value Points**
Complex Structure	**281 - 450 Total Weighted Value Points**

I. Regional/National Preparedness Levels

Regional and National Preparedness Levels are monitored by the RFMC. Big Oaks NWR will contact the RFMC concerning reporting requirements or limits to prescribed burning activities. Guidelines are set forth in the National Interagency Mobilization Guide. Big Oaks NWR will adhere to the direction given as preparedness levels change. Generally, regional preparedness levels follow the national level.

J. Potential Impacts of Plan Implementation

Big Oaks NWR's management ignited prescribed fire program is sensitive to potential adverse impacts. All known or suspected impacts are addressed within the Environmental Assessment completed for this FMP and, once approved, will be included as Appendix K to this document. Visitors will be warned ahead of time of a planned burn. Most of the burn blocks are well within Big Oaks NWR's boundary, easily accessible, and present few control problems. Threats to human life and property are minimal. There are no known social and economic impacts.

Smoke management is critical for prescribed fire planning at Big Oaks NWR. Highway 421 is adjacent to Big Oaks NWR on the east and is a concern for smoke management. Prescriptions will be designed to minimize impacts along this major transportation corridor and on nearby homes. Wind direction and ignition patterns will be carefully prescribed to carry smoke away from potentially impacted roadways. As a further precaution, warning signs or guards will be used to advise motorists of a burn in progress if smoke was to reduce visibility along one of the roads adjacent to Big Oaks NWR. Listed below are written principles that will guide smoke management planning at Big Oaks.

1. Have clear objectives. Be sure to have clear resource objectives and consider the impact on the total environment, both on and off-site.

2. Obtain and use weather forecasts. Weather information is needed to determine what will happen to smoke, as well as to determine the behavior of fire.

3. Don't burn during pollution alerts or temperature inversions. Smoke tends to stay near the ground and not disperse readily.

4. Comply with air pollution control regulations. Check with the appropriate agency prior to burning.

5. Burn when conditions are good for rapid smoke dispersion. The atmosphere should be slightly unstable so smoke will rise and dissipate rapidly.

6. Determine the direction and volume of smoke and use caution when near or upwind of smoke sensitive areas. Burning should be done when wind will carry smoke away from heavily traveled roads, airports, and populated areas.

7. Use test fires to confirm smoke behavior. Set test fires in the area proposed for burning, away from roads and other "edge" effects.

8. Notify local fire control office. Notification will inform potentially impacted residents that it is not a wildfire.

9. Use backing fires where possible. Assuming resource management objectives can be met, backing fires produce more complete consumption of fuels and produce less smoke. If other firing methods are used, ensure that fire is hot enough and the weather conditions are suitable to vent smoke into the upper atmosphere.

10. Burn in small blocks. The larger the area being burned, the more visibility is reduced downwind and the higher the concentration of particulates put into the air. However, it may be better to burn all of an area when weather conditions are ideal for smoke dispersion.

11. Mop-up along roads. Burn out and mop-up operations should be started as soon as possible along roads to reduce smoke impact on visibility.

12. Have an emergency plan. Be prepared to control traffic on nearby roads if the wind direction changes. Be prepared to stop a prescribed fire if it is not burning according to plan or if weather conditions change.

13. Follow the prescription and burn smart. Burn when duff and soil moisture levels are high to prevent smoldering ground fires. Burn under conditions of low relative humidity and fuel moisture to avoid smoke particles from combining with moisture to produce smog and poor visibility. Avoid days with low transport windspeed (less than 9 MPH) or low morning mixing heights (less than 1640 feet).

Additional information regarding smoke management can be found in the following publications:

Southern Forestry Smoke Management Guidebook. Mobley et al., USDA Forest Service. GTR SE-10, December 1976.

Prescribed Fire Smoke Management. National Wildfire Coordinating Group. Publication No. 420-1, February, 1985.

With the exception of smoke, there are no other known negative environmental impacts associated with prescribed fire implementation at Big Oaks NWR. Local communities are far enough away that smoke should not seriously impact them. In addition, much of the burning contemplated at Big Oaks NWR is composed of fine fuels which burn out quickly and normally do not produce lingering smoke problems. Prescribed fires in other fuel types will be carefully prescribed and implemented to avoid smoke problems.

K. Documentation Requirements

To implement management ignited prescribed fire on Big Oaks NWR, a Prescribed Fire Plan is prepared, addressing the required elements as outlined within the Fire Management Handbook. The Plan is usually prepared and submitted by the ROS. The Plan is then reviewed by the RFMC and Burn Boss and given final approval by the RM.

Prior to burn implementation, a checklist of burn-day actions, as specified within the burn plan, and a Go NoGo Checklist are completed and become part of the final burn report. Additional documentation includes burn day notifications and contacts, documentation of current, expected, and extended forecasted weather conditions for a three to five day period beyond the day of the burn. The Burning Boss is responsible for gathering and documenting the above information prior to burn implementation.

Normally the position of a Prescribed Fire Behavior Analyst is not activated. The Burn Boss assumes this role and documents all fire behavior and weather readings specified within the Burn Plan. He may chose to delegate this responsibility. A critique is made for each burn where the Burn Boss documents Burn Plan implementation. The Burn Boss also will evaluate burn objective accomplishment in consultation with the ROS.

Post-burn monitoring and follow-up evaluation will be the responsibility of the ROS. It is important that this documentation be completed, attached to the burn report, and sent to the Regional Biologist and RFMC as feedback to wildlife objective accomplishment.

L. Reporting Requirements

Each individual burn will have a DI-1202 (Appendix G) and narrative prepared and entered into the Fire Management Information System FMIS. A hard copy, along with the documentation listed above, will be kept on file at the Big Oaks NWR office. A copy will also be sent to the RFMC for input into the Fire Management Information System.

M. Critique Format

Critiques will follow the format specified within the Fire Management Handbook (1.4-31). This will be the minimum standard. Additional critique documentation, such as prescribed burn summaries and cost documentation, will be prepared as necessary based on refuge or regional needs.

X. WILDLAND FIRES MANAGED FOR RESOURCE BENEFITS

The fire management program at Big Oaks NWR will focus on suppression of human-caused wildland fires and management of ignited prescribed fires. The Service could manage some naturally occurring fires (e.g, caused by lightning) under pre-written plans (i.e., a natural prescribed fire plan) to accomplish specific resource management objectives. The Service does not have an active prescribed natural fire program and it is not anticipated that such a program will be implemented at Big Oaks NWR.

The Service will utilize the full spectrum of fire management actions - from control suppression efforts to confine and contain strategies to realize and accomplish specific resource objectives during naturally ignited wildland fires. This policy promotes fire management actions along a "sliding scale" with ranges of minimal on-the-ground actions to prompt, aggressive actions to fully extinguish the fire. Use of this spectrum of responses allows land managers more flexibility to design responses closely allied with objectives and fuel, weather, and topographic conditions. This will permit the refuge to achieve effectiveness and efficiency in operations. (Fire Management Handbook 1.1-9)

XI. AIR QUALITY/SMOKE MANAGEMENT GUIDELINES

Visibility and clean air are primary natural resource values at Big Oaks NWR and the protection of these resources will be given full consideration in fire management planning and operations. Big Oaks NWR will comply with all applicable Federal, Indiana State, and local air pollution control requirements, as specified within Section 118 of the Clean Air Act, as amended (42 USO 7401). In addition, further guidance can be found in the Fire Management Handbook, 2.3, pp. 1-9.

Our objective at Big Oaks NWR is to take aggressive action to manage smoke from wildland and prescribed fires in order to minimize negative impacts to visibility/public safety and maintain air quality. For the type of burns occurring at Big Oaks, the following guidelines will be followed when planning a prescribed fire and addressing wildfire planning.

1. Obtain an open burning permit from IDEM.

2. All burning is conducted according to the terms and conditions of the permit.

3. All burning is permitted provided that the existing wind speed, wind direction, and atmospheric conditions do not create nuisance smoke conditions.

4. Smoke sensitive areas will be identified and addressed within the Prescribed Fire Plan. The direction of wind vector selected will be such that smoke and other particulate emissions are transported away from sensitive areas.

5. Burning will be conducted only when visibility exceeds four miles and when the fire weather forecast indicates the presence of an unstable airmass; mixing heights are greater than 1640 feet and a minimum of 9 MPH windspeed is required.

6. No burning will occur if any government agency has issued an air pollution health advisory, alert, warning, or emergency for the area surrounding Big Oaks NWR.

7. Backing and flanking fires will be used when possible to minimize particulate emissions.

8. Media sources will be kept informed of any adverse fire and smoke dispersal conditions throughout any fire event.

XII. FIRE RESEARCH AND/OR MONITORING

Currently, monitoring is being conducted annually on Henslow's sparrow populations. The resulting Henslow's sparrow population index may be used to indirectly indicate changes in habitat resulting from Big Oaks NWR's prescribed fire program. It is believed that the extensive amount of prescribed burning currently being conducted on Big Oaks NWR will require research, on specific plant and animal responses, and these should be initiated in the near future. Fire research or monitoring projects of Regional or National significance can be submitted to the RFMC for consideration. The RFMC can provide further information on the procedures necessary to implement fire research projects.

XIII. PUBLIC SAFETY

Our greatest concern is the safety of all suppression personnel and the public when a wildland fire or prescribed burn is in progress. Only properly trained and qualified personnel will be assigned to fire activities. After the initial attack phase is complete, unqualified individuals at the incident will be relieved from suppression duty, or reassigned to a non-fireline function when adequate initial attack forces arrive.

XIV. PUBLIC INFORMATION AND EDUCATION

The public will be notified of any emergency response on Big Oaks NWR, the incident's status, and of any special restrictions that may affect the general public. It is important to convey the fact that the incident is being handled by trained professionals. It is just as important to be supportive of the public's concerns, accurately report what is known about the incident, and explain the actions that are being undertaken to bring the situation under control.

Within the Incident Command System, an Information Officer position is identified. The Information Officer is responsible for the preparation and release of all information concerning the incident to the news media, incident personnel, and other agencies. Normally a structured overhead team will include this position to handle all public inquiries generated by the incident. If an overhead team is not required, but an Information Officer is needed, consider using refuge office support personnel to handle media and public inquiries.

The same degree of communication is required for any management ignited prescribed fires. It is essential to keep the local populace informed of prescribed fires through the issuance of news releases. Usually this will include the preparation of a news release prior to any prescribed burns.

Public education is a critical component of fire management. It is an important tool to garner support and understanding for Big Oaks NWR's fire management program. An education program that teaches the value of fire as a management tool to achieve resource objectives will be incorporated into Big Oaks NWR's overall educational program.

XV. ARCHEOLOGICAL/CULTURAL/HISTORIC RESOURCES

Preparation for prescribed fires such as constructing fire lines are subject to Section 106 of the National Historic Preservation Act. The procedures in the Notice dated December 8, 1999, "Historic Preservation Responsibilities," apply to the planning and preparation for conducting prescribed fires.

Efforts to control wildland fires (including prescribed fires that get out of control) are also subject to Section 106 of the National Historic Preservation Act. We will meet our obligations under this act in the following ways:

When the land covered by a wildfire has been inventoried to identify cultural resources, and the cultural resources have been evaluated for significance according to the criteria for the National Register of

Historic Places, the Fire Management Officer will direct ground disturbing fire suppression efforts around (will avoid impacting) historic properties. Nevertheless, evidence of a previously undetected cultural resource may be encountered. The project leader shall immediately notify the Regional Historic Preservation Officer (RHPO). The RHPO will take immediate steps to have the cultural resource evaluated and protected, as appropriate, to the extent required by law and policy. This may require arranging for a qualified professional to visit and evaluate the site's importance and recommend a course of action. An evaluation and decision on the disposition of the cultural resource should be made within 48 hours of the discovery unless the project's schedule allows greater flexibility.

When the land covered by a wildfire has *not* been inventoried for cultural resources and wildfire suppression activities do result in ground disturbing activities, we will take the following action. Soon after fire control, the project leader will contact the RHPO to arrange for an archeologist to investigate the disturbed areas to determine if sites were affected.

Refuge operations and maintenance funds (subactivity 1261) will pay the cost of these activities unless the action is an emergency archeological and historic property survey in unstable areas prone to further degradation (i.e., erosion) following a wildland fire or in association with an emergency fire rehabilitation treatment. Emergency archeological and historic property surveys in unstable areas prone to further degradation (i.e., erosion) following a wildland fire or in association with an emergency fire rehabilitation treatment, and archeological, historic structure, cultural landscape, and traditional cultural property resource stabilization and rehabilitation can be funded with emergency rehabilitation funding (subactivity 9262).

XVI. FIRE CRITIQUES AND ANNUAL PLAN REVIEW

The RM is responsible for conducting a fire review of all wildfires occurring on refuge lands. This review will normally yield information important to improving future suppression planning and implementation. Big Oaks NWR's Fire Management Plan will be modified as needed based on fire review recommendations.

This plan will be reviewed annually. Changes in format or content (including Directory changes) identified from the previous fire season will be incorporated by October 1. Cooperative Agreements will be reviewed prior to the start of the fire season. Other refuge plans associated with fire suppression and presuppression are reviewed annually as well. Changes will be documented and forwarded to the RFMC for review.

A structured overhead team, brought in to manage a large incident, will be debriefed by the RM upon their release from the incident. The Incident Commander will prepare a written narrative of the fire activities and present it to the RM as a required part of the debriefing. The RM will assess the overhead team's performance using the appropriate ICS evaluation form and submit a copy to the RFMC.

XVII. CONSULTATION AND COORDINATION

The intent of the fire management program at Big Oaks NWR is to protect and enhance natural resources in support of refuge management goals and objectives. Section 7 consultation procedures and smoke management guidelines will be followed. Maintaining a good working relationship with the Indiana Department of Natural Resources and Department of Environmental Management and other Agencies is essential to the overall fire management program. Throughout the planning stages of this document, the Service was in direct contact with the U.S. Fish and Wildlife Ecological Services Office at Bloomington, Indiana, the Indiana Division of Forestry and other state and Federal agencies. Through these contacts, throughout the planning and writing process, the Service was able to identify the concerns of these agencies and, where possible, incorporate their concerns and suggestions into this document.

APPENDICES

APPENDIX A

FEDERAL AND STATE SPECIES OF CONCERN THAT OCCUR OR ARE LIKELY TO OCCUR AT BIG OAKS NATIONAL WILDLIFE REFUGE

APPENDIX A

Federal and State Listed Species Present or Suspected at Big Oaks National Wildlife Refuge

Status	Common Name	Scientific Name	Federal Classifications			IN Classification			Habitat
			FE	FT	FSC	E	T	SC	
MUSSELS									
Present-YR	Salamander mussel	*Simpsonaias ambigua*						X	medium to large rivers on mud and gravel bars
CRUSTACEAN									
Present-YR	Rusty Crayfish	*Orconectes rusticus*			N				lacustrine, riverine
INSECTS									
Potential	American Burying Beetle	*Nicrophorus americanus*	X			X			forest, grassland, mixed woodland
Potential	Dusted Skipper	*Atrytonopsis hianna*					X		prairies, old fields
Potential	Mottled Duskywing	*Erynnis martialis*				X			open brushy fields
Potential	Regal Fritillary	*Speyeria idalia*				X			tall grass prairie
AMPHIBIANS									
Present-YR	Mudpuppy	*Necturus maculosus*						X	river, streams, ponds
Suspected	N. Crawfish Frog	*Rana areolata circulosa*				X			crawfish holes
Potential	Eastern Spadefoot	*Scaphiopus holbrookii holbrookii*						X	forest areas w/sandy soils

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Status	Common Name	Scientific Name	Federal Classifications			IN Classification			Habitat
			FE	FT	FSC	E	T	SC	
REPTILES									
Present-YR	Kirtland's Snake	*Clonophis kirtlandii*				X			moist meadow and forest
Suspected	Rough Green Snake	*Opheodrys aestivus*						X	riparian habitat
Potential	N. Copperbelly Water Snake	*Nerodia erythrogaster neglecta*			R/D				swamps, marshes
BIRDS									
Present-M	Double-crested Cormorant	*Phalacrocorax auritus*			N				lacustrine, riverine, barren lands (islands) , forests (islands)
Potential-B	Least Bittern	*Ixobrychus exilis*				X			marsh and wet meadows
Present-M	American Bittern	*Botaurus lentiginosus*				X			marshes, wet meadows
Potential-B	Yellow-crowned Night-Heron	*Nyctanassa violacea*				X			moist woods, swamps
Present-M	Black-crowned Night-Heron	*Nycticorax nycticorax*				X			moist woods, swamps
Present-M	Great Egret	*Ardea alba*						X	marshes
Present-B	Great Blue Heron	*Ardea herodias*						X	marshes, streams
Present-M	Sandhill Crane	*Grus canadensis*					X		marshes, grasslands

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Status	Common Name	Scientific Name	Federal Classifications			IN Classification			Habitat
			FE	FT	FSC	E	T	SC	
BIRDS cont'd.									
Potential-B	Blue-winged Teal	*Anas discors*			REC				palustrine, grasslands
Present-B	Mallard	*Anas platyrhynchos*			REC				palustrine, grasslands, forest (mature bottomland)
Present-M	American Black Duck	*Anas rubripes*			REC				lacustrine, palustrine (shrub/scrub)
Present-B	Wood Duck	*Aix sponsa*			REC				palustrine, riverine, forests
Potential-B	King Rail	*Rallus elegans*				X			swamps and marshes
Present-M	Virginia Rail	*Rallus limicola*						X	marshes, wetlands
Potential-M	Yellow Rail	*Coturnicops noveboracensis*							marshes, wet fields
Present-M	Black Rail	*Laterallus jamaicensis*							marshes, wet meadows
Present-B	American Woodcock	*Scolopax minor*			R/D				moist woodland, thickets
Present-M	Bald Eagle	*Haliaeetus leucocephalus*		X		X			lacustrine, riverine, forests
Present-M	Northern Harrier	*Circus cyaneus*				X			wetlands and open fields
Present-YR	Sharp-shinned hawk	*Accipter striatus*						X	mixed woodlands
Present-YR	Red-shouldered hawk	*Buteo lineatus*			R/D			X	moist, mixed woodlands

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Status	Common Name	Scientific Name	Federal Classifications			IN Classification			Habitat
			FE	FT	FSC	E	T	SC	
BIRDS cont'd.									
Present-B	Broad-winged Hawk	*Buteo platypterus*						X	woodlands
Present-M	Osprey	*Pandion haliaetus*				X			riverine, lacustrine
Suspect-M	Peregrine Falcon	*Falco peregrinus*				X			palustrine, lacustrine, riverine
Suspected-YR	Barn Owl	*Tyto alba*				X			grasslands
Present-M	Short-eared Owl	*Asio flammeus*				X			marshes, weedy fields
Present-M	Marsh Wren	*Cistothorus palustris*				X			marshes and swamps
Present-B	SedgeWren	*Cistothorus platensis*			R/D	X			moist meadows
Present-B	Loggerhead Shrike	*Lanius ludovicianus*			R/D			X	open or brushy areas
Present-M	Golden-winged Warbler	*Vermivora chrysoptera*				X			shrub/scrub
Present-B	Black-and-White Warbler	*Mniotilta varia*						X	mixed mature woodlands
Present-B	Cerulean Warbler	*Dendroica cerulea*						X	swamps, bottomlands, mixed woodlands
Potential-M	Kirtland's Warbler	*Dendroica kirtlandii*	X			X			open woodlands, shrub, thickets
Present-M	Canada Warbler	*Wilsonia canadensis*						X	dense woodlands
Present-B	Hooded Warbler	*Wilsonia citrina*						X	moist mature woodlands

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Status	Common Name	Scientific Name	Federal Classifications			IN Classification			Habitat
			FE	FT	FSC	E	T	SC	
BIRDS cont'd.									
Present-B	Worm-eating warbler	*Helmitheros vermivorus*						X	mature forest
Present-B	Grasshopper Sparrow	*Ammodramus savannarum*			R/D				grasslands, old fields
Present-B	Henslow's Sparrow	*Ammodramus henslowii*				X			moist meadows and fields
Potential-B	Bachman's Sparrow	*Aimophila aestivalis*				X			dry open woods
Present-B	Dickcissel	*Spiza americana*			R/D				weedy meadows, prairies
Present-M	Bobolink	*Dolichonyx oryzivorus*			R/D				weedy meadows, hayfields
Present-B	Eastern Meadowlark	*Sturnella magna*			R/D				fields, meadows
MAMMALS									
Suspected	Bobcat	*Lynx rufus*				X			mixed woodland
Present-YR	River Otter	*Lutra canadensis*				X			marshes, rivers, lakes
Potential-M	Gray Bat	*Myotis grisescens*	X			X			caves
Present-B	Indiana Bat	*Myotis sodalis*	X			X			caves, forest
Potential	Smokey Shrew	*Sorex fumeus*						X	moist woods
PLANTS									
Present	American Ginseng	*Panax quinquefolium*						X	rich woods
Present	American Pinesap	*Monotropa hypopithes*						X	woods

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Status	Common Name	Scientific Name	Federal Classifications			IN Classification			Habitat
			FE	FT	FSC	E	T	SC	
PLANTS cont'd.									
Present	Black Bugbane	*Cimicifuga racemosa*						X	woods
Present	Blunt-lobe Grape-fern	*Botrychium oneidense*						X	mature flatwoods
Present	Broom Panic-grass	*Panicum scoparium*				X			moist soil
Present	Barren Strawberry	*Waldsteinia fragarioides*						X	woods, clearings
Present	Carolina Willow	*Salix caroliniana*						X	streams, exposed gravel bars
Present	Clasping St. John's Wort	*Hypericum gymnanthum*				X			eroded areas
Present	Climbing Fern	*Lygodium palmatum*				X			early successional flat woods
Present	Clustered Foxglove	*Agalinis fasciculata*						X	moist fields, young flatwoods
Present	Crinkleroot	*Dentaria diphylla*						X	moist woods
Present	Dwarf Ginseng	*Panax trifolius*						X	flatwoods, moist upland forest
Present	Elliptical Rushfoil	*Crotonopsis elliptica*				X			eroded banks, bladed roadbanks
Present	False Hellebore	*Veratrum woodii*						X	forested ravines and narrow stream valleys
Present	Fewflower Nutrush	*Scleria pauciflora*						X	grassy fields
Present	Goldenseal	*Hydrastis canadensis*						X	moist ravine forests

APPENDIX A

Status	Common Name	Scientific Name	Federal Classifications			IN Classification			Habitat
			FE	FT	FSC	E	T	SC	
PLANTS cont'd.									
Present	Illinois Woodsorrel	*Oxalis illinoensis*						X	floodplain forest
Present	Lesser Ladies'-tresses	*Spiranthes ovalis*						X	forest, floodplain forest
Present	Little Ladies'-tresses	*Spiranthes tuberosa*						X	eroded old fields, dry upland forest
Present	Longbeak Arrowhead	*Sagittaria australis*						X	wetland, flatwoods, stream banks
Present	Louisiana Sedge	*Carex louisianica*						X	floodplain forest
Present	Maryland Meadow-beauty	*Rhexia mariana var. mariana*				X			moist, acidic grasslands
Present	Narrow-leaved Sunflower	*Helianthus angustifolius*				X			moist, acid grasslands
Present	Netted Chain-fern	*Woodwardia areolata*						X	regrowth flatwoods
Present	Northern bog Clubmoss	*Lycopodeiella inundata*				X			shallow ditches
Present	Pretty Sedge	*Carex woodii*						X	moist woodlands
Present	Purple Fringeless Orchis	*Platanthera peramoena*						X	moist meadows, open swampy woods
Present	Ragged-fringed Orchis	*Platanthera lacera*						X	wet, open fields, young flatwoods
Present	Ridged Yellow Flax	*Linum striatum*						X	flatwoods

APPENDIX A

Status	Common Name	Scientific Name	Federal Classifications			IN Classification			Habitat
			FE	FT	FSC	E	T	SC	
PLANTS cont'd.									
Present	Round-leaved Boneset	*Eupatorium rotundifolium*						X	grassy fields, open flatwoods
Potential	Running Buffalo Clover	*Trifolium stoloniferum*	X						open woodlands
Present	Running Pine	*Lycopodium clavatum*						X	regrowth flatwoods
Present	Silver Bluestem	*Andropogon ternarius*						X	old fields, grassy barrens
Present	Single-head Pussytoes	*Antennaria solitaria*						X	woods, clearings
Present	Slick Seed Wild-bean	*Strophostyles leiosperma*					X		eroded areas
Present	Small Sundrops	*Oenothera perennis*					X		meadows, fields
Present	Smooth White Violet	*Viola blanda*						X	mature flatwoods
Present	Sparse-lobe Grape-fern	*Botrychium biternatum*						X	old fields
Present	Spotted Wintergreen	*Chimaphila maculata*						X	upland woods
Present	Thicket Sedge	*Carex abscondita*						X	moist forest, stream valleys
Present	Thread-like Naiad	*Najas gracillima*				X			shallow water
Present	Tree Clubmoss	*Lycopodium obscurum*						X	regrowth flatwoods
Present	Twining Bartonia	*Bartonia paniculata*						X	open flatwoods
Present	Wall-rue Spleenwort	*Asplenium ruta-muraria*					X		limestone cliffs
Present	Weakstalk Bulrush	*Scirpus purshianus*				X			edge of bodies of water

APPENDIX A

Status	Common Name	Scientific Name	Federal Classifications			IN Classification			Habitat
			FE	FT	FSC	E	T	SC	
PLANTS cont'd.									
Present	Wolf Bluegrass	*Poa wolfii*						X	limestone boulders, moist woods
Present	Yellow Buckeye	*Aesculus octandra*						X	ravine forest

Status:

Present-known to occur
Suspected-some evidence that it occurs
Potential-potentially within the species range

B-breeds on site, **M**-found on site during migratory periods, **YR**-found on site year round

Federal Classifications:

Endangered (FE) - Any species that is in danger of extinction throughout all or a significant portion of its range.
Threatened (FT)- Any species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Federally threatened species are designated with a "FT".
Species of Concern (FSC)- An informal term referring to those species Region 3 believes might be in need of concentrated conservation actions. These species of concern receive no legal protection and the use of the term does not mean that the species will eventually be proposed for listing as a threatened or endangered species. Federal species of concern are designated with "FSC".
R/D - rare/declining
REC - recreational/economic value
N - nuisance species

APPENDIX A

Indiana Animal Classifications:

Endangered (E)- Any animal species whose prospects for survival or recruitment within the state are in immediate jeopardy and are in danger of disappearing from the state. This includes all species classified as endangered by the federal government which occur in Indiana.

Threatened- An animal species whose survival in Indiana is not in immediate jeopardy, but to which a threat exists. Continued or increased stress will result in its becoming endangered.

Special Concern (SC)- Any animal species about which some problems of limited abundance or distribution in Indiana are known or suspected and should be closely monitored.

Indiana Plant Classifications:

Endangered - Any plant species whose prospects for survival or recruitment within the state are in immediate jeopardy and are in danger of disappearing from the state. This includes all species classified as endangered by the federal government which occur in Indiana. One to five extant populations in the state.

Threatened - Any species that is likely to become endangered within the state in the foreseeable future throughout all or a significant portion of its range. Six to ten extant populations within the state.

Rare - Eleven to twenty extant populations within the state.

Watch List - Greater than (>) 20 extant populations, but populations are still considered at risk.

APPENDIX B

COOPERATIVE AGREEMENTS

APPENDIX B

FIRE CONTROL AGREEMENT
BETWEEN
BIG OAKS NATIONAL WILDLIFE REFUGE
AND THE
NEW MARION VOLUNTEER FIRE DEPARTMENT, INC.

THIS AGREEMENT is made by and between the New Marion Volunteer Fire Department, Inc. and the Big Oaks National Wildlife Refuge of the U.S. Fish and Wildlife Service, under the authority of "The Protection Act of September 20, 1922" (42 Stat. 857; 16 U.S.C. 594), the "Reciprocal Fire Protection Act of May 27, 1955" (69 Stat. 66, 67; 42 U.S.C. 1856a. and b.), and the corporation "By-laws of New Marion Volunteer Fire Department, Inc.".

WITNESSETH:

WHEREAS, The U.S. Fish and Wildlife Service (hereinafter the "Service") is the agency of the Federal Government primarily responsible for the welfare and protection of lands and wildlife within the boundaries of the Big Oaks National Wildlife Refuge (hereinafter the "Refuge"); and

WHEREAS, it is the desire of the Service to provide maximum protection of the Refuge, its lands, wildlife, personnel, and facilities from fire; and

WHEREAS, it is the desire of the New Marion Volunteer Fire Department, Inc. (hereinafter referred to as the "Fire Department") to provide protection for its lands, citizens, and buildings within the fire district from fire and;

WHEREAS, the objective, as stated in 6 RM 7.3 of the "Refuge Manual", of fire management is, "... to protect and enhance habitat for fish and wildlife production and diversity, and to protect and enhance natural ecosystems on these (Refuge) lands." and;

WHEREAS, it is desirable for both parties to establish a cooperative agreement toward meeting the need for prevention, detection, and suppression of wildland fires within the Big Oaks National Wildlife Refuge, provided, however, that a mutual understanding is reached between both parties on the following matters:

ARTICLE I. Definitions

1. Refuge Lands: Lands administered and/or protected by the Big Oaks National Wildlife Refuge/U.S. Fish and Wildlife Service; these lands constitute the Refuge's jurisdictional area.

2. Fire District Area: Lands protected by the Fire Department; these lands constitute the Fire Department jurisdictional area.

3. Wildland Fire: A fire that burns uncontrolled in vegetative or associated flammable materials; fire principally involving structures or facilities is not considered a wildland fire.

4. Boundary Fire: A fire burning astride a boundary between lands protected by two or more protecting agencies, or due to conditions on the ground in the fire area, believed to be burning astride a boundary.

5. Protecting Agency: The party with the responsibility for suppression of wildland fires within their jurisdictional area.

6. Supporting Agency: The party without responsibility for suppression of wildland fires on a particular piece of land; i.e., the party furnishing assistance or support to the protecting agency.

ARTICLE II. The Fire Department Agrees:

1. To provide, as is available, the manpower and equipment necessary and available for use, to suppress wildland fires on lands within the Refuge, under the direction of the Fire Chief or other superior officer of the Fire Department, and the supervision of the Refuge Manager, or his designated representative; in consultation with the Fire Chief or other superior officer of the Fire Department.

2. To notify the Refuge when suppression equipment and personnel are not available for any wildfires on the Refuge.

3. To abide by the Standard Operating Procedures found in Attachment 1.

4. During suppression activities by the Fire Department of wildland fires on lands within the Refuge, the Refuge Manager has final authority on entrance into, and activities performed upon, Refuge lands due to the presence of Unexploded Ordnance and the inherent dangers thereof.

ARTICLE III. The Refuge Agrees:

1. To provide, when available, the manpower and/or equipment necessary and available for use to suppress fires on Refuge lands.

2. During suppression activities by the Fire Department of wildland fires on lands within the Refuge, to delegate the authority to the Fire Department necessary to put the Fire Chief, or his designee, in command of the firefighting effort subject to restrictions as outlined in Article II-3.

ARTICLE IV. Meetings and Designations of Lead Agency

1. The parties hereto shall meet at least annually, prior to April 1, to review operations and planning hereunder. It is agreed the Refuge Manager, Big Oaks National Wildlife Refuge, shall be responsible for setting a mutually convenient date, time, and place for said meeting.

ARTICLE V. Special Provisions

1. This agreement shall not affect the rights of any party to recover suppression costs and/or damages sustained as a result of the negligent or willful act of any person causing a fire.

2. No party shall be liable to any other for any loss, damage, personal injury, or death occurring in consequence of the performance of this agreement, except as provided herein.

3. The parties may work jointly on fire trespass investigations and fire law enforcement. Reports thereof may be prepared independently and separately.

4. Copies of fire reports shall be mutually provided to the other agency (ies) involved in the fire suppression as soon as possible following the fire action.

5. The Service will reimburse the Fire Department for actual suppression costs, as per the attached schedule, not to exceed $1,000.00 per response or $10,000.00 per fiscal year without further approval of the Refuge Manager.

6. A list of equipment susceptible to a liability claim is attached as part of the addendum. The Refuge Manager will be contacted by the Fire Department to assist in the filing of such a claim within thirty (30) days of the incident. Such liability does not extend to loss of life.

7. Any actions required under this agreement are subject to the availability of funds.

8. No member of or delegate of Congress or resident commissioner after his election or appointment, either before or after he has qualified and during his continuance

ARTICLE VI. Modification and Duration

1. THIS AGREEMENT shall become effective on October 1, 2000 and shall continue in effect until September 30, 2001, and shall be considered as automatically extended for one (1) year each October 1 thereafter, until terminated.

2. Each Party hereto shall be obligated to submit to the other copies of any legislation or regulation hereinafter adopted which comes to the attention of that party, which in any way affects the provisions of this agreement.

3. THIS AGREEMENT may be amended by written mutual consent of the parties hereto, or may be terminated by either party giving the other at least thirty (30) days written notice in advance; but, such termination shall not relieve either party of obligations left outstanding under the terms of this agreement.

THE NEW MARION VOLUNTEER FIRE DEPARTMENT, INC.

Charles Meisberger, Fire Chief Date: 6-29-00

BIG OAKS NATIONAL WILDLIFE REFUGE

Lee Herzberger, Refuge Manager Date: 6-27-00

APPENDIX B

SCHEDULE OF SUPPRESSION REIMBURSEMENT

The U.S. Fish and Wildlife Service will reimburse the New Marion Volunteer Fire Department, Inc. for services as listed below and paid in half-hour increments calculated from the time the suppression unit arrives at the scene until it departs.

A fire suppression unit is any truck with water carrying and pumping capability which is attended by a crew of at least two operator-firefighters.

1. False alarms, fires suppressed prior to arrival, and prescribed fire "No Go" days: $50.00 per unit per hour.

2. Actual suppression activities: $125.00 per unit per hour.

3. Mop-up, overhaul, fire watch, and other specifically authorized post-suppression and post-prescribed fire activities: $70.00 per unit per hour.

4. Assistance with prescribed fires: $125.00 per unit per hour.

5. Portable Water Tank: $100.00 per use.

6. Light Generator Plant: $100.00 per use.

7. Rescue Equipment Package: $100.00 per use.

MAJOR EQUIPMENT: NEW MARION VOLUNTEER FIRE DEPARTMENT, INC.

TYPE	YEAR	MAKE	DESCRIPTION	CURRENT VALUE
Pumper Truck	1996	IHC	1,250-gallon tank and 1,000 GPM pump	$170,000
Pumper Truck	1959	IHC	1,500-gallon tank and 750 GPM pump	$15,000
Tanker Truck	1986	IHC	2,100-gallon tank and 250 GPM pump	$75,000
Brush Truck	2000	HUMMER	300-gallon tank and 250 GPM pump	$92,000
Brush Truck	1951	M37	250-gallon tank and 200 GPM pump	$10,000

Attachment 1 **APPENDIX B**

Standard Operating Procedures (SOP)
within
Big Oaks National Wildlife Refuge

1. For all brush fires and structural fires.

   A. Enter at Gate 8.
   B. At least one firefighter will stay at Gate 8 with a radio to direct personnel.
   C. Fire trucks will have 2 men aboard before proceeding to fire.
   D. If Chief is not on the Refuge, ranking officer will be in charge (OIC).
   E. The OIC will go to perimeter road closest to fire with radio and wait for word from Refuge Manager.
   F. All other fire fighters will remain at Gate 8 until OIC tells location and issues orders.
   G. OIC must know the location of all firefighters at all times and who they are.
   H. No one is to leave roadways.
   I. Containment will be the only suppression option used.
   J. Backfires will be lit away (>3,000') from the fire.
   K. Vehicles must have radios or be in a convoy with a radio.
   L. If personnel leave early, they will report to OIC first before proceeding to Gate 8 and checking out with person at Gate 8.

2. Special Notes

   A. For structural fires all trucks roll.
   B. For brush fires BO2 and BO3 roll first. BO1 will be the last truck out if needed.

3. These SOP's will be reviewed by the chief as needed.

APPENDIX C

NORMAL UNIT STRENGTH EQUIPMENT
&
STATIONED OWNED EQUIPMENT INVENTORY
&
EQUIPMENT NEEDS LIST

ITEM	NUS
Shelters, Hard Hats, Head Lamps, Goggles, Packs, Line Gear, First Aid Kits, Water Bottles	1 per qualified FFT2 individual plus 20%.
Tents	1 per qualified FFT2 individual.
Nomex Pants, Nomex Shirts, Gloves	1 per qualified FFT2 individual plus 20% of common sizes.
Shovels, Pulaskis, McLeods, Flaps, Fire Rakes	2 per qualified FFT2 individual plus 10% for each type of tool. An assortment of handtools, with a minimum of 3, will be maintained for each piece of equipment (ie. Bombadier, Autocar, Fire Trucks).
Flight Helmets	2 per station.
Back Pack Pumps	1 per 2 qualified FFT2 individual.
Chain Saws	2 per station
Portable Pumps	2 Floto Pumps per station.
Foam	15 gallons per engine.
Hose (per engine & portable pump)	1 ½ " - 900 feet 1" - 900 feet
Nozzles (1" & 1 ½ " total)	2 - portable pump 4 - engine Plus 20% for total number of nozzles on engines, water and foam combined.
Wyes, Tees, Wrenches, Relief Valves, Hose Clamps, etc.	2 - portable pump 3 - engine Plus 10% for each item.
Adapters and Reduces	2 - portable pump 3- engine Plus 10% for each item.

* Equipment used to dig into the soil can not be use on the refuge due to the potential presence of UXO within the Refuge.

All Refuge staff members with firefighting training will be issued appropriate personal protective equipment (PPE).

STATIONED OWNED EQUIPMENT

Item	Description	Quantity
Vehicle	2001 Dodge Dakota 4x4 pick-up	1
Vehicle	1998 Dodge 4x4 pick-up (diesel)	1
Vehicle	1997 Chevy 4x4 Blazer	1
Equip.& Acces.	Chain saw (18"- bar)	1
Equip.& Acces	Chain saw (14"-bar)	1
Equip.& Acces	Type 6 Slip-On Pumper	1

Future Firefighting Equipment Needs

Item/Description	Quantity	Justification
Fire Swatter “Flapper”	6	Equipment most likely to be issued to firefighters given the potential presence of UXO.
Fire Rake	4	Equipment will provide Refuge firefighting personnel effective and safe means to remove litter or debris without disturbing the soil.
Brush Hook	4	Equipment will provide Refuge firefighting personnel an effective and safe means to remove debris, overhanging limbs, and small saplings.
Fold-A-Tank	1	This tank will provide Refuge firefighting personnel a means to store water at designated sites for later use.
Portable Pump	2	This pump will provide Refuge firefighting personnel a means to extract water from alternate sources (e.g., ponds, streams, or lakes) into pumpers or tanks during prescribed burns and/or fire suppression activities.
Hose	1.5" x 900' 1.0" x 550'	The purchase of 1.5" and 1.0" hose will provide Refuge firefighting personnel adequate hose to fight and suppress wildfires.
Nozzles (1", 1.5", and pistol grip w/ open & close (1", PG), Tee’s, Wye’s, foot valve, ball valve, check valve, hose adapters and reducers, and various wrenches and hose clamps	Several of each item are needed	These various water handling items are necessary for efficient use or movement of water during prescribed burns and/or fire suppression activities.
4x4 Crew cab pick-up truck	1	This vehicle is necessary for the transport of firefighters and/or equipment to designated sites on the Refuge during prescribed burns and/or fire suppression activities. It can also be used to transport a pumper or water tanker to various sites on the Refuge during prescribed burns and/or fire suppression activities.

Future Firefighting Equipment Needs

Item/Description	Quantity	Justification
4x4 ATV	3	These vehicles are necessary for the transport of firefighters and/or equipment through dense vegetation, serve as a means to ignite a fire with the use of a ATV drip torch, and act as another method to transport firefighters to designated sites on the Refuge during prescribed burns and/or fire suppression activities.
Grader	1	A Grader will be necessary to maintain firebreaks/roads. These firebreaks/roads would not be maintained in a condition suitable to act as effective firebreaks if maintained only as access roads.
Tractor with mower deck	1	A tractor with a mower deck will be needed to mow existing fire breaks.
6' x 10' Utility Trailer	1	A trailer will be necessary to transport fire equipment and ATVs to designated sites on the Refuge during prescribed burns and/or fire suppression activities.
Electronic Weather Kit	1	A weather kit will provide Refuge firefighting personnel valuable information about burning conditions.
Type 6 Slip-on-Pumper	1	An additional pumper will provide Refuge firefighting personnel an effective means to control and maintain prescribed burns and/or wildfire suppression.

APPENDIX D

STEP-UP PLAN

FOR

BIG OAKS NATIONAL WILDLIFE REFUGE

APPENDIX D

BIG OAKS NATIONAL WILDLIFE REFUGE STEP-UP PLAN

Staffing and Adjective Class	Step-Up Action
SC-1 Low	Normal Tour of Duty and operations. Normal number of qualified initial attack personnel on duty. Deputy Manager ensures that all firefighting equipment is serviced and available.
SC-2 Moderate	Normal Tour of Duty and operations. Normal number of qualified initial attack personnel on duty. Deputy Manager ensures that all firefighting equipment is serviced and available.
SC-3 High	Normal Tour of Duty and operations. Normal number of qualified initial attack personnel on duty. Deputy Manager ensures that all firefighting equipment is serviced and available. Schedule routine ground patrols of Refuge Units and make daily checks of all fire management units.
SC-4 Very High	Normal Tour of Duty to include weekend coverage and possibly evening coverage to 1800 hours. Intensified road patrols for prevention and detection purposes. Minimum of two initial attack personnel on duty or available on 60 minutes notice. Refuge heavy equipment readily available with operator available on 60 minutes notice. Curtail all prescribed burning operations, or within prescription, seek RFMC approval.
SC-5 Extreme	Normal Tour of Duty to include weekend coverage and evening coverage to 1800 hours. Minimum of two initial attack personnel on duty or available on 60 minutes notice. Refuge heavy equipment operators readily available, with extended hours beyond normal Tour of Duty as necessary. Follow Indiana State Fire Closure restrictions, or consider temporary closures of portions of Refuge to visitation. No prescribed burning will be implemented.

APPENDIX E

WILDLAND FIRE SITUATION ANALYSIS (WFSA)

FOR

BIG OAKS NATIONAL WILDLIFE REFUGE

APPENDIX E

WILDLAND FIRE SITUATION ANALYSIS (WFSA)

INTRODUCTION

The WFSA is a decision process that employs a systematic and reasonable approach to determine the most appropriate strategy for a particular situation. Reasonable suppression alternatives are identified, analyzed and evaluated, and are consistent with the expected probability of success/consequences of failure. The agency administrator (Refuge Manager or acting Refuge Manager) shall approve the WFSA and any revisions. Evaluation criteria include anticipated suppression costs, resource impacts, and environmental, social, and political considerations. The evaluation of alternatives must clearly identify the point at which the failure of the alternative is imminent. This becomes the triggering mechanism for re-evaluation of the WFSA.

WFSA GENERAL INSTRUCTIONS

- FIRE SITUATION - This portion of the analysis is intended to provide basic information on the fire, including identification of fire, dates and times of the analysis, and the location of the fire.
  - Fuels: Type. Describe the fuels in the area in terms which will be useful for analysis purposes, i.e., mature sagebrush, young ponderosa pine, grass, etc.
  - Fire Behavior: Current. Briefly discuss the fire weather in terms of temperatures, wind and daily patterns. Describe the fire in non-technical terms, such as creeping, spotting, crowning, etc. Discuss the flame lengths, rates of spread, etc. Predicted. Describe what the future course of the fire will be based on the predicted weather patterns, fuels and topography in the presence of the fire, and any other pertinent factors.

- EVALUATION CRITERIA - Specify criteria which must or should be considered in the development of alternatives. Economic criteria might include closure of all or portions of the refuge, thus impacting concessionaire, or impacts to transportation or communications system. Environmental criteria might also include management objectives, airshed, water quality, etc. Social or external criteria would include any local attitudes toward fire or smoke that might affect decisions on the fire, safety, etc. Other criteria might include the legal or administrative constraints which would have to be considered in the analysis of the fire situation, such as the need to keep the fire off other agency lands, etc.

- ALTERNATIVES - Develop alternative plans to control the fire. These will be the results you expect to achieve. All alternatives may have the same general plan, but may have different specific plans. Or there may be different general plans with similar specific plans. A map must be prepared showing each alternative. The map should be based upon the "calculation of probabilities" and include other relevant information. A "no suppression" alternative is not acceptable. An alternative which does not meet all "must" criteria is not acceptable.
  - Strategy. Briefly state the alternative strategies for management of the fire. Use geographic names, locations, etc. Roughly designate each strategy on a map.
    - Allow fire to play a natural role
    - Aggressive Attack
    - Sustained Attack

    - Other strategies as appropriate
  - Tactics. Briefly discuss tactical considerations, including general estimates of suppression forces required to accomplish the strategic plan.
    - Direct attack
    - Indirect attack
    - Parallel attack
    - Containment
    - Surveillance
    - Other tactics as appropriate
  - Resources: Include equipment, aircraft, and personnel resources.
  - Estimated Probability of Success. Base estimates for 0-100% for each alternative strategy.
  - Estimated Date of Control. Estimates for each alternative should be made based on predicted weather behavior factor, barriers, fuels, etc., and the effects of suppression efforts.

- ANALYSIS OF EFFECT - The analysis is based on the best estimates of the refuge, resource and fire managers. Fire effects may be negative, cause no change, or may be positive. Employ those evaluations most useful to the specific situation. Some examples: 1) a system which employs a "-" for negative effect, a "0" for no change, or a "+" for positive effect; 2) a system which uses a numeric factor for importance of the consideration (soils, watershed, political, etc.) and assigns values (such as -1 to +1, -100 to +100, etc.) to each consideration, then arrives at a weighted average. It may be that actual dollar values for resources are available. If so, these would be an especially valuable tool. Use those methods most useful to managers. Cost plus loss is the sum of losses from market elements, non-market elements, social elements, and suppression costs.

- EVALUATION -
  - Economic. Evaluate any economic criteria against each alternative. Include improvements, visitor use, concessions, fee enhancement, etc.
  - Environmental:
  - Soils. Identify any soil problems which may occur as a result of the fire (water repellency information, etc.).
  - Water/Watershed. Indicate decreases in water quality due to vegetation loss. Consider the potential for increased water yield as a result of vegetation losses.
  - Visual/Recreation. Loss of alternative vegetation, short-term blackened and charred landscape. Consider potential for more attractive views with introduction of vegetative mosaics.
  - Air Quality. Consider the problem of smoke in populated areas or during scenic periods of time. Analyze the vicinity of the fire for those areas where smoke could cause a hazard by obscuring highway or airport visibility. Off-site as well as on-site effects must be considered.
  - Wilderness. Values may include fire as a natural process. Does a wilderness or wilderness study area have a fire management plan allowing a fire to burn under certain conditions? Do managers want fire in the wilderness? Must fire be kept out of the wilderness to preserve wilderness characteristics?
  - Wildlife. Consider the damage done to wildlife due to loss of critical habitat or loss of cover. Positive benefits may include vegetation diversity, increased edges, and more

vegetation available for wildlife because of sprouting in burning brush.

- Fuel Reduction. If a serious hazard has built up and is identified, it may be advisable to allow the fire to remove the fuel.
- Social:
- Safety. No alternatives will be selected which endanger the lives of the public or of firefighters. Any fire or portion of a fire endangering human life will receive immediate, aggressive, and sustained attack.
- Property and Improvements. Any fire or portion of a fire endangering property will receive immediate and sustained attack, consistent with public and firefighter safety.
- Political Consideration. Designate any concerns other public agencies may have in regard to one or all of the suppression strategies, or specify areas of specific concern to the other agencies. This could include such things as use of equipment in and around refuge boundaries, areas of cultural resources, etc.
- Other: Add any additional factors which may be unique to the area or situation, such as rare and endangered plants or animals, or by other considerations not previously mentioned.

- DECISION TREE - The Decision Tree is a discussion and justification as to why preferred alternative was selected based on the evaluation criteria.
-

3.4.4. PRE-ATTACK WILDLAND FIRE SITUATION ANALYSIS

The pre-attack WFSA is an WFSA that is completed by the refuge staff during the pre-attack planning process. It translates refuge fire management objectives into a concise action document which determines initial suppression strategy. To ensure that all important decision criteria are adequately addressed during the initial stages of a fire emergency, selective use of a pre-attack WFSA is recommended. Although this process applies in any refuge with identified suppression zones, it is most useful in those refuges, or portions of refuges, with only one viable suppression alternative. The pre-attack WFSA will serve as the framework for a WFSA if the fire exceeds the parameters of the selected alternative.

APPENDIX E

Exhibit 3.4.1 Wildland Fire Situation Analysis Form

Wildland Fire Situation Analysis

Incident Name: _____
Jurisdiction: _____

Date and Time Completed: _____

This page is completed by the Agency Administrator(s).

Section I, WFSA Information Page

A. Jurisdiction(s): Assign the agency or agencies that have or could have fire protection responsibility, e.g., USFWS, BLM, etc.

B. Geographic Area: Assign the recognized "Geographic Coordination Area" the fire is located in, e.g., Northwest, Northern Rockies, etc.

C. Unit(s): Designate the local administrative unit(s), e.g., Hart Mountain Refuge Area, Flathead Indian Reservation, etc.

D. WFSA #: Identify the number assigned to the most recent WFSA for this fire.

E. Fire Name: Self-explanatory.

F. Incident #: Identify the incident number assigned to the fire.

G. Accounting Code: Insert the local unit's accounting code.

H. Date/Time Prepared: Self-explanatory.

I. Attachments: Check here to designate items used to complete the WFSA. "Other could include data or models used in the development of the WFSA. Briefly describe the "other" items used.

I. Wildland Fire Situation Analysis	
To be completed by the Agency Administrator(s)	
A. Jurisdiction(s)	***B. Geographic Area***

C. Unit(s)	***D. WFSA #***
E. Fire Name	***F. Incident #***
G. Accounting Code:	
H. Date/Time Prepared _____@_____	
I. Attachments	
*- Complexity Matrix/Analysis ** _____	
*- Risk Assessment/Analysis ** _____	
*Probability of Success ** _____	
*Consequences of Failure ** _____	
*- Maps ** _____	
*- Decision Tree *** _____	
*- Fire Behavior Projections ** _____	
*- Calculations of Resource Requirements ** _____	
- Other (specify) _____	
** Required*	
*** Required by FWS*	

This page is completed by the Agency Administrator(s).

Section II. Objectives and Constraints

A. Objectives: Specify objectives that must be considered in the development of alternatives. Safety objectives for firefighter, aviation, and public must receive the highest priority. Suppression objectives must relate to resource management objectives in the unit resource management plan.

Economic objectives could include closure of all or portions of an area, thus impacting the public, or impacts to transportation, communication, and resource values.

Environmental objectives could include management objectives for airshed, water quality, wildlife, etc.

Social objectives could include any local attitudes toward fire or smoke that might affect decisions on the fire.

Other objectives might include legal or administrative constraints which would have to be considered in the analysis of the fire situation, such as the need to keep the fire off other agency lands, etc.

B. Constraints: List constraints on wildland fire action. These could include constraints to designated wilderness, wilderness study areas, environmentally or culturally sensitive areas, irreparable damage to resources or smoke management/air quality concerns. Economic constraints, such as public and agency cost, could be considered here.

II.	***Objectives and Constraints***
To be Completed by the Agency Administrator(s)	

A. Objectives *(Must be specific and measurable)*

1. Safety

- Public

- Firefighter

2. Economic

3. Environmental

4. Social

5. Other

B. Constraints

This page is completed by the Fire Manager and/or Incident Commander.

Section III. Alternatives

A. Wildland Fire Management Strategy: Briefly describe the general wildland fire strategies for each alternative. Alternatives must meet resource management plan objectives.

B. Narrative: Briefly describe each alternative with geographic names, locations, etc., that would be used when implementing a wildland fire strategy. For example: "Contain within the Starvation Meadows' watershed by the first burning period."

C. Resources Needed: Resources described must be reasonable to accomplish the tasks described in Section III.B. It is critical to also look at the reality of the availability of these needed resources.

D. Final Fire Size: Estimated final fire size for each alternative at time of containment.

E. Estimated Contain/Control Date: Estimates of each alternative shall be made based on predicted weather, fire behavior, resource availability, and the effects of suppression efforts.

F. Cost: Estimate all incident costs for each alternative. Consider mop-up, rehabilitation, and other costs as necessary.

G. Risk Assessment - Probability of Success/Consequences of Failure: Describe probability as a percentage and list associated consequences for success and failure. Develop this information from models, practical experience, or other acceptable means. Consequences described will include fire size, days to contain, days to control, costs, and other information such as park closures and effect on critical habitat. Include fire behavior and long-term fire weather forecasts to derive this information.

H. Complexity: Assign the complexity rating calculated in "Fire Complexity Analysis" for each alternative, e.g., Type II, Type I.

I. A map for each alternative should be prepared. The map will be based on the "Probability of Success/Consequences of Failure" and include other relative information.

III.	***Alternatives (To be completed by FMO / IC)***		
	A	***B***	***C***
A. Wildland Fire Strategy			
B. Narrative			

C. Resources needed			
Hand crews	_____	_____	_____
Engines	_____	_ _____	_ _____
Dozers	_____	_____	_____
Air tankers	_____	_ _____	_ _____
Helicopters	_____	_ _____	_ _____
D. Final Size			
E. Est. Contain/ Control Date			
F. Costs			
G. Risk Assessment			
- Probability of success	_____	_____	_____
- Consequence of failure	_____	_____	_____
H. Complexity			
I.	***Attach maps for each alternative***		

Section IV. Evaluation of Alternatives

A. Evaluation Process: Conduct an analysis for each element of each objective and each alternative. Objectives shall match those identified in Section II.A. Use the best estimates available and quantify whenever possible. Provide ratings for each alternative and corresponding objective element. Fire effects may be negative, cause no change, or may be positive. Examples are: 1) a system which employs a "-" for negative effect, a "0" for no change, and a "+" for positive effect; 2) a system which uses a numeric factor for importance of the consideration (soils, watershed, political, etc.) and assigns values (such as -1 to +1, - 100 to +100, etc.) to each consideration, then arrives at a weighted average. If you have the ability to estimate dollar amounts for natural resource and cultural values, this data is preferred. Use those methods which are most useful to managers and most appropriate for the situation and agency. To be able to evaluate positive fire effects, the area must be included in the resource management plan and consistent with prescriptions and objectives of the fire management plan.

Sum of Economic Values: Calculate for each element the net effect of the rating system used for each alternative. This could include the balance of:

pluses (+) and minuses (-), numerical rating (-3 and +3), or natural and cultural resource values in dollar amounts. (Again, resource benefits may be used as part of the analysis process when the wildland fire is within a prescription consistent with approved Fire Management Plans and in support of the unit's Resource Management Plan.)

IV. Evaluation of Alternatives			
To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander			
A. Evaluation Process	***A***	***B***	***C***
Safety *Firefighter* *Aviation* *Public*			
Sum of Safety Values			
Economic *Forage* *Improvements* *Recreation* *Timber* *Water* *Wilderness* *Wildlife* *Other (specify)*			
Sum of Economic Values			
Environmental *Air* *Visual* *Fuels* *T & E Species* *Other (specify)*			
Sum of Environmental Values			

Social *Employment* *Public Concern* *Cultural* *Other (Specify)*			
Sum of Social Values			
Other			

This page is completed by the Agency Administrator(s) and Fire Manager and/or Incident Commander.

Section V. Analysis Summary

A. Compliance with Objectives: Prepare narratives that summarize each alternative's effectiveness in meeting each objective. Alternatives that do not comply with objectives are not acceptable. Narrative could be based on effectiveness and efficiency. For example: "most effective and least efficient," "least effective and most efficient," or "effective and efficient." Or answers could be based on a two-tiered rating system such as "complies with objective" and "fully complies with or exceeds objective." Use a system that best fits the manager's needs.

B. Pertinent Data: Data for this Section has already been presented, and is duplicated here to help the Agency Administrator(s) confirm their selection of an alternative. Final Fire Size is displayed in Section III.D. Complexity is calculated in the attachments and displayed in Section III.H. Costs are displayed on page 4. Probability of Success/Consequences of Failure is calculated in the attachments and displayed in Section III.G.

C. External and Internal Influences: Assign information and data occurring at the time the WFSA is signed. Identify the Preparedness Index (1 through 5) for the National and Geographic levels. If available, indicate the Incident Priority assigned by the MAC Group. Designate the Resource Availability status. This information is available at the Geographic Coordination Center, and is needed to select a viable alternative. Designate "yes," indicating an up-to-date weather forecast has been provided to, and used by, the Agency Administrator(s) to evaluate each alternative. Assign information to the "Other" category as needed by the Agency Administrator(s).

Section VI. Decision

Identify the alternative selected. Must have clear and concise rationale for the decision, and a signature with date and time. Agency Administrator(s) is mandatory.

V. Analysis Summary

To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander

Alternatives	***A***	***B***	***C***
A. Compliance with Objectives *Safety* *Economic* *Environmental* *Social* *Other*			
B. Pertinent Data *Final Fire Size* *Complexity* *Suppression Cost* *Resource Values* *Probability of Success* *Consequences of Failure*			

C. External / Internal Influences

National & Geographic Preparedness Level _____

Incident Priority _____

Resource Availability _____

Weather Forecast (long-range) _____

Fire Behavior Projections _____

VI.	***Decision***
The Selected Alternative is: _____	
Rationale:	
_____ *Agency Administrator's Signature*	_____ *Date/Time*

This Section is completed by the Agency Administrator(s) or designate.

Section VII. Daily Review

The date, time, and signature of reviewing officials are reported in each column for each day of the incident. The status of Preparedness Level, Incident Priority, Resource Availability, Weather Forecast, and WFSA validity is completed for each day reviewed. Ratings for the Preparedness Level, Incident Priority, Resource Availability, Fire Behavior, and Weather Forecast are addressed in Section V.C. Assign a "yes" under "WFSA Valid" to continue use of this WFSA. A "no" indicates this WFSA is no longer valid and another WFSA must be prepared or the original revised.

Section VIII. Final Review

This Section is completed by the Agency Administrator(s). A signature, date, and time are provided once all conditions of the WFSA are met.

VII.	***Daily Review***
To be completed by the Agency Administrator(s) or Designate	
Selected to be reviewed daily to determine if still valid until containment or control	

APPENDIX E

			PREPAREDNESS LEVEL	INCIDENT PRIORITY	RESOURCE AVAILABILITY	WEATHER FORECAST	FIRE BEHAVIOR PROJECTIONS	WFSA VALID
Date	***Time***	***By***						

If WFSA is no longer valid, a new WFSA will be completed!

VIII. Objectives	***Final Review***
The elements of the selected alternative were met on: _____ *Date*	_____ *Time*
*By:*_____ *(Agency Administrator(s)*	

3.4.3 A GUIDE FOR ASSESSING FIRE COMPLEXITY

A GUIDE FOR ASSESSING FIRE COMPLEXITY

The following questions are presented as a guide to assist the Agency Administrator(s) and staff in analyzing the complexity or predicted complexity of a wildland fire situation. Because of the time required to assemble or move an Incident Management Team to wildland fire, this checklist should be completed when a wildland fire escapes initial attack and be kept as a part of the fire records. This document is prepared concurrently with the preparation of (and attached to) a new or revised Wildland Fire Situation Analysis. It must be emphasized this analysis should, where possible, be based on predictions to allow adequate time for assembling and transporting the ordered resources.

Use of the Guide:

1. *Analyze each element and check the response "yes" or "no."*

2. *If positive responses exceed, or are equal to, negative responses within any primary factor (A through G), the primary factor should be considered as a positive response.*

3. *If any three of the primary factors (A through G) are positive responses, this indicates the fire situation is, or is predicted to be, Type I.*

4. *Factor H should be considered after all the above steps. If more than two of these items are answered "yes," and three or more of the other primary factors are positive responses, a Type I team should be considered. If the composites of H are negative, and there are fewer than three positive responses in the primary factors (A-G), a Type II team should be considered. If the answers to all questions in H are negative, it may be advisable to allow the existing overhead to continue action on the fire.*

GLOSSARY OF TERMS

Potential for blow-up conditions - *Any combination of fuels, weather, and topography excessively endangering personnel.*

Rate or endangered species - *Threat to habitat of such species or, in the case of flora, threat to the species itself.*

Smoke management - *Any situation which creates a significant public response, such as smoke in a metropolitan area or visual pollution in high-use scenic areas.*

APPENDIX E

Extended exposure to unusually hazardous line conditions - *Extended burnout or backfire situations, rock slide, cliffs, extremely steep terrain, abnormal fuel situation such as frost killed foliage, etc.*

Disputed fire management responsibility - *Any wildland fire where responsibility for management is not agreed upon due to lack of agreements or different interpretations, etc.*

Disputed fire policy - *Differing fire policies between suppression agencies when the fire involves multiple ownership is an example.*

Pre-existing controversies - *These may or may not be fire management related. Any controversy drawing public attention to an area may present unusual problems to the fire overhead and local management.*

Have overhead overextended themselves mentally or physically - *This is a critical item that requires judgment by the responsible agency. It is difficult to write guidelines for this judgment because of the wide differences between individuals. If, however, the Agency Administrator feels the existing overhead cannot continue to function efficiently and take safe and aggressive action due to mental or physical reasons, assistance is mandatory.*

	FIRE COMPLEXITY ANALYSIS	*Yes*	*No*
A	*FIRE BEHAVIOR: Observed or Predicted*		
1	*Burning Index (from on-site measurement of weather conditions). Predicted to be above the 90% level using the major fuel model in which the fire is burning.*		
2	*Potential exists for "blowup" conditions (fuel moisture, winds, etc.)*		
3	*Crowning, profuse or long-range spotting.*		
4	*Weather forecast indicating no significant relief or worsening conditions.*		
	Total		
B.	*RESOURCES COMMITTED*		
1	*200 or more personnel assigned.*		
2	*Three or more divisions.*		
3	*Wide variety of special support personnel.*		
4	*Substantial air operation which is not properly staffed.*		
5	*Majority of initial attack resources committed.*		
	Total		
C	*RESOURCES THREATENED*		
1	*Urban interface.*		
2	*Developments and facilities.*		

APPENDIX E

	FIRE COMPLEXITY ANALYSIS	*Yes*	*No*
3	*Restricted, threatened or endangered species habitat.*		
4	*Cultural sites.*		
5	*Unique natural resources, special designation zones or wilderness.*		
6	*Other special resources.*		
	Total		
D	*SAFETY*		
1	*Unusually hazardous fire line conditions.*		
2	*Serious accidents or facilities.*		
3	*Threat to safety of visitors from fire and related operations.*		
4	*Restricted and/or closures in effect or being considered.*		
5	*No night operations in place for safety reasons.*		
	Total		
	OWNERSHIP		
1	*Fire burning or threatening more than one jurisdiction.*		
2	*Potential for claims (damages).*		
3	*Conflicting management objectives.*		
4	*Disputes over fire management responsibility.*		
5	*Potential for unified command.*		
	Total		
F	*EXTERNAL INFLUENCES*		
1	*Controversial wildland fire management policy.*		
2	*Pre-existing controversies/relationships.*		
3	*Sensitive media relationships.*		
4	*Sensitive political interests.*		
5	*Other external influences.*		
	Total		
G	*CHANGE IN STRATEGY*		
1	*Change in strategy to control from confine or contain.*		

APPENDIX E

	FIRE COMPLEXITY ANALYSIS	*Yes*	*No*
2	*Large amount of unburned fuel within planned perimeter.*		
3	*WFSA invalid or requires updating.*		
	Total		
H	*EXISTING OVERHEAD*		
1	*Worked two operational periods without achieving initial objectives.*		
2	*Existing management organization ineffective.*		
3	*IMT overextended themselves mentally and/or physically.*		
4	*Incident action plans, briefings, etc., missing or poorly prepared.*		
	Total		
	TOTAL		
Signature:	*Date:*	*Time:*	

APPENDIX F

DELEGATION OF AUTHORITY FOR FIRES
AT
BIG OAKS NATIONAL WILDLIFE REFUGE

APPENDIX F

Delegation of Authority

_____is assigned as Area/Incident Commander on the _____ Fire. You have full responsibility for managing the fire suppression activities within the framework of law, Agency policy, and direction within the framework of law, Agency policy, and direction provided in the Overhead Briefing and/or Escaped Fire Situation Analysis.

Your primary responsibility is to organize and direct your assigned and ordered resources for efficient and effective suppression of the fire. You are accountable to the _____ or his designated representative listed below. Financial limitations will be consistent with the best approach to the values at risk.

Specific direction for the _____ Fire covering management and environmental concerns are as follows:

_____, will represent me on any occasion that I am not immediately available. This authority is effective as of _____.

_____ _____
Date/Time

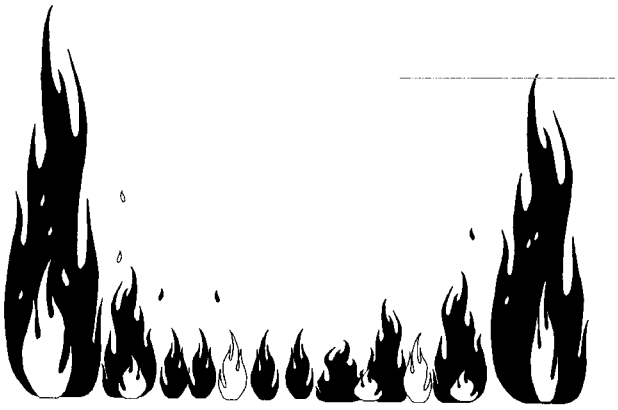
APPENDIX G

INDIVIDUAL FIRE REPORT
FOR
BIG OAKS NATIONAL WILDLIFE REFUGE

APPENDIX G

U.S. FISH AND WILDLIFE SERVICE

Individual Fire Report Instructions
(DI-1202)



June 1997

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
INDIVIDUAL FIRE REPORT INSTRUCTIONS
FOR USE WITH DI-1202

GENERAL DI-1202 INSTRUCTIONS

1. The fire reporting process will be done by data entry into the computer. A fire number will automatically be assigned to the fire.

2. Report and record each individual fire on a separate form.

3. DO NOT ENTER ZEROS to the left of significant numbers except where indicated as part of the code entry.

4. Each Fire Report is to be entered into the FMIS computer system within **20 days** after the fire has been declared out.

5. An original hard copy needs to be kept on file because FMIS cannot capture the map and signature at this time.

6. A narrative for each fire will be included in the Remarks section. Other items that require clarification are also reported in this section.

7. DO NOT use more digits than are indicated by dashes on the form.

8. Enter only the code numbers, except as specified in the Specific Instructions.

9. Enter the **MANDATORY** data for the following type fires:

FIRE TYPE 1 (SUPPRESSED FIRE)

Item	Description	Item	Description
1	Status Code	9e	Cost Code
2-3d	Header	9f	Ownership at Origin
4a-b	Fire Type	9g	Fiscal Year
5	Cause	10a	Discovery: date/time/type/acres
6	People	10b	Initial Attack: date/time/type/amt/acres
*8a	State	10c	Control: date/time/acres
*8b	Owner	11a	Topography
*8c	Vegetative Type	11b	Aspect
*8d	Acres	11c	Slope
*8d	Acres	11d	Elevation
9a	Fire Name	11g	Fire Behavior
9b	Area Name	* 8a-8d Repeats (up to 8 of State,	
9c	Latitude/Longitude	Owner, Vegetative Type, Acres) as needed.	

All other items are optional.

APPENDIX G

FIRE TYPE 2 (NATURAL OUTS)

Item	Description	Item	Description
1	Status Code	10a	Discovery: date/time/type/acres
2-3d	Header	10d	Declared Out: date
4a-b	Fire Type	11a	Topography
5	Cause (if known)	11b	Aspect
*8a	State	11c	Slope
*8b	Owner	11d	Elevation
*8c	Vegetative Type		
*8d	Acres		
9a	Fire Name	*8a-8d Repeats (up to 8 of State, Owner, Vegetative Type, Acres) as needed	
9c	Latitude/Longitude		
9e	Cost Code		
9f	Ownership at Origin		
9g	Fiscal Year		

All other items are optional.

FIRE TYPE 3 (SUPPORT ACTIONS)

Item	Description	Item	Description
1	Status Code	9a	Fire Name
2-3d	Header	9e	Cost Code
4a-b	Fire Type: (Must always be 37)	9f	Fiscal Year
8a	State	9h	Fiscal Data
8b	Owner	10a	Discovery: date

All other items are optional.

FIRE TYPE 48 (PLANNED IGNITION)

Item	Description	Item	Description
1	Status Code	9h	Agency Fiscal Data
2-3d	Header	10a	Discovery: date/time
4a-b	Fire Type	10c	Controlled: acres
*8a	State	10d	Declared Out: date
*8b	Owner	11a-d	Site Data
*8c	Vegetative Type	11e	NFDRS Station (if available)
*8d	Acres	11f	MSGC (if 11e is completed)
9a	Fire Name	11h	BI (if 11e is completed)
9b	Area Name	13c	Plot Objective
9c	Latitude/Longitude	13d	Firing Type
9f	Ownership	13e	Cost/Acre
9g	Fiscal Year		

All other items are optional.

*8a-8d may be repeated up to 8 times if needed.

FIRE TYPE 49 (UNPLANNED IGNITION)

Item	Description	Item	Description
1	Status Code	10a	Discovery: date/time
2-3d	Header	10c	Controlled: acres
4a-b	Fire Type	10d	Declared Out: date
*8a	State	11a-d	Site Data
*8b	Owner	11e	NFDRS Station (if available)
*8c	Vegetative Type	11f	MSGC (if 11e is completed)
*8d	Acres	11h	BI (if 11e is completed)
9a	Fire Name	13c	Plot Objective
9b	Area Name	13d	OMIT
9c	Latitude/Longitude	13e	Cost/Acre
9f	Ownership		
9g	Fiscal Year		
9h	Agency Fiscal Data	**All other items are optional.**	

*8a-8d may be repeated up to 8 times if needed. Only the first set is mandatory.

FIRE TYPE 5 (ACTION TYPE FALSE ALARMS)

Item	Description	Item	Description
1	Status Code	10a	Discovery: data/time/type/acres
2-3d	Header	10b	Initial Attack: type/amount
4a-b	Fire Type		
8a	State		
8b	Owner		
9a	Fire Name	**DO NOT PREPARE A REPORT FOR A NO ACTION TYPE FALSE ALARM !!!**	
9e	Cost Code		
9g	Fiscal Year		
9h	Agency Fiscal Data		

APPENDIX G
SPECIFIC INSTRUCTIONS

PART I - WILDFIRES

1. REPORT STATUS CODE - (Automatic Fill)

2. REPORTING AGENCY - This refers to the Government agency submitting the report. (Automatic fill)

3. a. UNIT - Enter first two digits of organization code (Automatic fill).

   b. SUB-UNIT - Enter last three digits of organization code (Automatic fill).

   c. CALENDAR YEAR - (Automatic fill)

   d. FIRE NUMBER - Fire number will automatically be assigned by the computer upon data entry. The entire report does not need to be entered into the computer to receive a fire number. The header (items 1 - 3c) is all that is required. The remainder of the report will need to be completed during and at the conclusion of the fire.

4. FIRE TYPE

   a. **Fire Type** - enter one of the following codes:

      (1) For all Fires Suppressed - Action taken by the reporting agency's employees, regardless of land ownership, or by contractors, or operators on reporting agency's land.

      (2) Natural Outs - Fires discovered after they have been extinguished by natural causes. **NO SUPPRESSION ACTION TOOK PLACE.**

      (3) Support Actions - Action taken at the request of a cooperator on a fire which is not threatening FWS land and no formal agreement exists which would require a FWS response. **Does not include initial attack under established mutual aid agreements.** (Protection Type 7).

      (4) Prescribed Fires - If the fire escaped and is declared a wildfire, the narrative for the prescribed fire should indicate such and reference the new assigned number for the wildfire. A new DI-1202 will be started for the newly declared wildfire. The cause and narrative should indicate that the wildfire resulted from an escaped prescribed fire.

      (5) False Alarms - For all reported fires on which some type of response was initiated (e.g., patrol plane or crew dispatched, etc.) but **no suppression action took place**, either because the fire was not found or it was not within reporting agency's jurisdiction.

b. PROTECTION TYPE - enter one of the following codes:

(1) For reporting agency land under reporting agency protection.

(2) For reporting agency land protected by another Federal agency under a Memorandum of Understanding or cooperative agreements.

(3) For reporting agency land protected by another non-Federal agency under a cooperative agreement or contract.

(4) This is NOT a valid code for FWS.

(5) For Other lands not under a Memorandum of Understanding, cooperative agreement or contract but where action is taken by the reporting agency to prevent fire spread to reporting agency lands.

(6) For Other lands protected by the reporting agency under a Memorandum of Understanding, cooperative agreement or contract.

(7) Support actions by the reporting agency under Fire Type 3.

(8) Prescribed Fire - Planned Ignition.

(9) Prescribed Fire - Unplanned Ignition.

5. CAUSE

General Cause	Code	Valid Combinations
◆ Natural	1	101, 131
Camp Fire	2	208
Smoking	3	310, 330
◆ Fire Use	4	411, 412, 413, 414, 415, 416, 417
Incendiary	5	518, 519, 522
Equipment	6	603, 604, 607, 623, 625
Railroads	7	704, 707
◆ Juveniles	8	819, 826, 827
Miscellaneous	9	902, 924, 926

Specific Cause (2nd and 3rd digit of Cause column)

Lightning	01	
Aircraft	02	
Burning Vehicle	03	
◆ Exhaust	04	
Exhaust - Other	***05***	Equipment/Exhaust
Logging Line	***06***	Equipment/Other
◆ Brakes	07	
◆ Cooking / Warming Fire	08	
Warming Fire	***09***	combined with cooking
Smoking	10	
Trash Burning	11	
Burning Dump	12	
Field Burning	13	
Land Clearing	14	
Slash Burning	15	
Right-of-way Burning	16	
*Resource Management Burning	17	
Grudge Fire	18	
Pyromania	19	
Smoking Out Bees or Game	***20***	Fire Use/Resource Mgmt Burning
Insect or Snake Control	***21***	Fire Use/Resource Mgmt Burning
Job Hunting	22	
Blasting	23	
Burning Building	24	
Power Line	25	
Fireworks	26	
Playing with Matches	27	
Repelling Predators	***28***	Fire Use/Resource Mgmt Burning
House or Stove Flue Sparks	***29***	Miscellaneous/Burning Building
Other (Unknown)	30	
◆ Volcanic	31	
◆ Other (Known)	32➜	(valid with all causes except smoking - 3)

◆ **** Use cause 417 for an escaped prescribed fire.***

6. CLASS OF PEOPLE - Enter the most likely class code for the individuals involved in the ignition of the incident from the following:

Code	Description
0.....	For all fires where cause is lightning or unknown.
1.....	For all individuals who own land or businesses within protection boundaries.
2.....	For all individuals, their agents or employees, who have special use permits on reporting agency lands within protection boundaries.
3.....	For contractors, their agents or employees for purchase of products or construction of facilities.
4.....	For all Federal, State, County, Municipal or other public employees.
5.....	For all permanent residents living inside or within one mile outside the protection boundary.
6.....	For all seasonal residents or workers residing inside or within one mile outside the protection boundary.
7.....	For all tourists, motorists, campers, etc., in transit through the protected area.

7. NET RESOURCE VALUE CHANGE PER ACRE - OMIT

8. STATISTICAL DATA

a. STATE - Enter the 2-letter State designator.

b. OWNERSHIP - Enter from the following: One entry must be FWS (4).

Ownership	Code
BLM	1
BIA	2
NPS	3
FWS	**4**
USFS	5
Other Federal Lands	6
State	7
Private	8
Other	9
Foreign	0

c. VEGETATIVE TYPE

Type	Code
Commercial Forest Land (Land producing or capable of producing wood products such as sawtimber, posts, poles, etc., and not withdrawn from timber use.)	1
Noncommercial Forest Land (Land not capable of yielding wood products or products or commercial forest land withdrawn from timber use.)	2
Nonforest Watershed (Land which has never supported forests or has been developed for nonforest uses.)	3

d. ACRES - Nearest tenth acre.

NOTE: Repeat Items 8a. thru 8d. for each change in State, Ownership or Vegetative Type. Items 8a. thru 8d. may be repeated up to 8 times if needed.

9. AGENCY DATA

a. FIRE NAME - Name is limited to 10 characters.

b. AREA NAME - Enter 2-digit Congressional District (CD) Code.

c. LATITUDE/LONGITUDE - Point of Origin. Enter latitude and longitude to the nearest minute for the point of origin. Can enter seconds.

d. LEGAL DESCRIPTION - May be used **in addition** to Latitude/Longitude. Enter Township, Range, Section and Meridian code. DO NOT USE DECIMALS OR FRACTIONS.

e. COST CODE - Enter from the following **Estimated Suppression**.

Cost Dollars	Code
0-100	1
101-500	2
501-1,500	3
1,501-5,000	4
5,001-25,000	5
25,001-50,000	6
50,001-100,00	7
100,001-500,000	8
500,001 & over	9

f. OWNERSHIP - Point of Origin - (This value must also be entered in 8b).

g. FISCAL YEAR - 4-digit automatic fill.

h. AGENCY FISCAL DATA - Enter best estimate of actual costs charged to fire number, including False Alarms (nearest dollar).

i. UNIVERSAL TRANSVERSE MERCATOR - UTM - May be used ***in addition*** to Latitude/Longitude.

j. FIRE PROBLEM CLASS - Omit

10. SUPPRESSION DATA

a. DATE DISCOVERED - MMDDYYYY - Enter 8-digit number for month, day, and year. (Example: October 12 = 10121997.) Enter the leading 0 (zero) if the month or day is less than 10.

TIME DISCOVERED - HHMM - Enter 4-digit number using 24-hour clock. (Example: 8:13 p.m. = 2013).

DETECTION - Enter code for detection type from following:

Type	Code
Agency Lookout	A
Other Lookout	B
Fire Patrolman	C
Other Agency Employee	D
Cooperator Employee	E
Agency Patrol Aircraft	F
Cooperator Patrol Aircraft	G
Other Aircraft	H
Permittee (All persons holding a use permit or contract on agency lands.)	I
Visitor	J
Local Resident (Permanent Residents on or adjacent to agency lands.)	K
Other	L
Smokejumper Patrol Flight	M
AFS Aircraft Not on Patrol	N

ACRES AT DISCOVERY - Enter to nearest tenth acre.

b. DATE OF INITIAL ATTACK - MMDDYYYY - Enter 8-digit number for month, day, and year. Enter the leading 0 (zero) if the month or day is less than 10.

TIME OF INITIAL ATTACK (defined as the time the first initial attack unit arrives at the incident) - HHMM - Enter 8-digit number using 24-hour clock.

TYPE OF INITIAL ATTACK - Enter code from the following list for first, second, and third units attacking fire.

Type	Code
Explosives (# of Crews)	A
Plows or Trenchers	B
Light Engines (Less than 300 gal)	C
Medium Engines (300-500 gal/50 GPM)	D
Heavy Engines (500 gal+/70 GPM)	E
Handcrew (# of Individuals)	F
Smokejumper (# of Individuals)	G
Helitack Crew (# of Individuals)	H
Light Airtanker (800-1000 gal-Type 3)	I
Medium Airtanker (1000-2000 gal-Type 2)	J
Heavy Airtanker (2000 gal+-Type 1)	K
Light Helitanker (up to 300 gal-Type 3 & 4)	L
Medium Helitanker (300-700 gal-Type 2)	M
Heavy Helitanker (700 gal+-Type 1)	N
Light Dozer (D-4 or Equiv.)	O
Medium Dozer (D-5, D-6 or Equiv.)	P
Heavy Dozer (D-7 and Larger or Equiv.)	Q
Other	R
Monitoring Fire by Air (Not for natural out)	S
Monitoring Fire by Ground (Not for natural out)	T
Reconnaissance Aircraft	U

AMOUNT OF INITIAL ATTACK - Enter the number of persons or pieces of equipment. When type of initial attack is Airplane Tanker (I-K) or Helicopter Tanker (L-N) or Helicopter Tanker (L-N), amount is number of drops. Code actual amount up to 99 items. For more than 99 items code zero (0). Enter number of flights for monitoring by air. Enter number of persons x number of days for ground monitoring (5 people x 3 days = 15).

ACRES AT INITIAL ATTACK (defined as size of fire at time initial attack unit arrives at the incident) - Enter to the nearest tenth acre.

c. DATE CONTROLLED - MMDDYYYY- Enter 8-digit number for month, day, and year. Enter the leading 0 (zero) if the month or day is less than 10.

TIME CONTROLLED - HHMM - Enter 4-digit number using 24-hour clock.

ACRES AT CONTROL - Enter total acres within control lines to nearest tenth acre.

d. DECLARED OUT - MMDDYYYY- Enter 8-digit number for month, day, and year. Enter the leading 0 (zero) if the month or day is less than 10.

11. SITE DATA

a. TOPOGRAPHY - Enter topography in vicinity of fire origin from the following:

Topographic Feature	Code
Ridgetop	1
Saddle	2
Upper 1/3 of slope	3
Middle 1/3 of slope	4
Lower 1/3	5
Canyon bottom	6
Valley bottom	7
Mesa or plateau	8
Flat or rolling	9

b. ASPECT - Enter appropriate code for the vicinity of the fire origin.

Aspect	Code
Flat	0
N	1
NE	2
E	3
SE	4
S	5
SW	6
W	7
NW	8
Ridgetop	9

c. SLOPE - Enter appropriate code for the vicinity of the fire origin.

Percent	Code
0-25	1
26-40	2
41-55	3
56-75	4
75+	5

d. ELEVATION - Enter appropriate code for the vicinity of the fire origin.

Elevation (ft)	Code
0-500	0
501-1500	1
1501-2500	2
2501-3500	3
3501-4500	4
4501-5500	5
5501-6500	6
6501-7500	7
7501-8500	8
8500+	9

e. NFDRS STATION - 6-digit NFDRS Station Number for the station describing the fire climate area in which the fire occurred, if available. Otherwise, leave blank.

f. FUEL MODEL (MSGC) - (Required if "e" is completed.) 4-character (Model/Slope/Grass Type/Climate Class) NFDRS fuel model designator characterizing vicinity of origin.

g. BEHAVIOR - Fire behavior characterizing vicinity of origin. (See Appendix 1 for narrative of the values.)

Fire Behavior	Code
Smoldering	1
Creeping/Spreading	2
Running	3
Running and Spotting	4
Torching	5
Crowning	6
Erratic Behavior	8

h. BURNING INDEX (Required if "e" is completed.) - NFDRS BI for the station (if any) used to determine manning for initial attack on date of fire. Otherwise, leave blank.

i. ADJECTIVE CLASS - Reserved for Alaska use

12. PREVENTION DATA **(Optional)**

◆ k. DAY OF WEEK

Day of Week	Code
Sunday	1
Monday	2
Tuesday	3
Wednesday	4
Thursday	5
Friday	6
Saturday	7

◆ l. WAS FIRE INVESTIGATED (Y/N):

Value	Code
Yes	Y
No	N

◆ m. FIRE CAUSE SUSPECT: Known or Unknown (K/U):

Value	Code
Known	K
Unknown	U

◆ n. SUSPECT: Resident, Transient, or Unknown (R/T/U):

Value	Code
Resident	R
Transient	T
Unknown	U

13. FUELS / EMISSIONS DATA

c. PLOT OBJECTIVE - Enter the code from the following table that best describes the primary burn objective.

Cultural Scene Maintenance	Code
Historical Scene Maintenance	01
Other Cultural Site Maintenance	02

Natural Systems	Code
Exotic or Undesirable Species Control	10
Habitat Maintenance	11
Research	12

Hazard Reduction	Code
Fuel Reduction - Activity Fuels	20
Fuel Reduction - Natural Fuels	21
Real Property Protection	22
Boundary Protection	23
Fuel Break Maintenance	24

Maintenance	Code
Debris Removal	30
Vista Removal	31
Health (Insect Control)	32
Right-of-Way Maintenance	33

Silvicultural	Code
Seed Bed Preparation	40
Vegetative Type Manipulation	41
Insect and Disease Control	42

d. FIRING TYPE (Planned Ignitions only) - Enter a 2-digit code from the following tables. The first digit describes the firing strategy and the second digit describes the application method.

1st position (strategy)	Code
head fire	1
backing fire	2
spot fire	3
concentric fire	4

2nd position (method)	Code
hand ignition	1
aerial ignition	2
remote ignition	3

e. COST/ACRE - Enter the average cost per acre experienced on the burn (total cost divided by total acres).

f. FUEL MODEL - Enter the 2-digit FBPS Fire Behavior Models that best characterize the fuels in the burn area from the following codes. The first entry should represent the majority (at least 50 percent) of the fuels in the burn. The second entry should represent any lesser fuel type that occurs in the burn area. The first fuel model is required and the second fuel model is optional.

Fuel Model	Code
Herb and Herb-Dominated	
Short Grass (1 foot)	01
Timber (Grass and Understory)	02
Tall Grass (2.5 feet)	03
Chaparral and Shrub Fields	
Chaparral (6 feet)	04
Brush (2 feet)	05
Dormant Brush, Hardwood Slash	06
Southern Rough	07
Timber Litter	
Closed Timber Litter	08
Hardwood Litter	09
Timber (Litter and Understory)	10
Slash	
Light Logging Slash	11
Medium Logging Slash	12
Heavy Logging Slash	13

l. OMIT

m. OMIT

n. FUEL LOADING FOR EMISSIONS (see Table 1)

o. OMIT

NARRATIVE (optional) - Enter information about the fire.

TITLE INFORMATION (mandatory)
Submitted By:
Submitted Title:
Submitted Date:
Entered By:
Entered Title:
Entered Date:

MAP (optional) - Plot the perimeter of the fire on a hard copy.

APPENDIX G - ATTACHMENT 1

Narrative Descriptions of Fire Behavior

1. **Smoldering** - A fire burning slowly through direct oxidation, in leaf mold, duff, peat, etc., in which there is little or no visible flame and little or no visible smoke, but some spread and definite heat output.

2. **Creeping/Spreading** - A fire burning in fuel, such as leaf mold, litter, or light grass, with both visible flame and smoke.

3. **Running** - A fire with significant output of heat such that direct attack might be impossible. Flame length could be expected to be in excess of 5 feet.

4. **Running and Spotting** - Fire behavior similar to "Running", but burning embers and firebrands are aloft and new ignitions started.

5. **Torching** - A fire in which the crowns or canopies of individual or groups of trees ignite; however, the fire does not continue into the canopy of surrounding vegetation.

6. **Crowning** - The fire tends to move through the overstory or canopy, generally keeping pace with or perhaps even preceding the surface fire.

7. **Crowning and Spotting** - The same as "Crowning", with firebrands carried aloft and starting fires some distance ahead.

8. **Erratic Behavior** - Involves fire whirls, fire storms, blowup conditions, or other fire behavior in which the fire's rate and direction of spread is largely unpredictable.

APPENDIX G

(TABLE 1)

MAX AND MIN FUEL LOADINGS BY SIZE CLASS FOR FBPS FUEL MODELS
DI-1202 FIELD 13n

FBPS FUEL MODEL	Load Range	Shrub + Herb T/A	0-1" T/A	1.1"-3" T/A	3.1"-9" T/A	9"+ T/A	Litter + Duff Inches
1 SHORT GRASS (1 foot)	MIN MAX	0.1 2.0	0 1.5	0 0	0 0	0 0	0 4.0
2 TIMBER (Grass & Understory)	MIN MAX	0.1 1.5	0 2.0	0 2.5	0 2.3	0 7.8	0 4.0
3 TALL GRASS (2.5 feet)	MIN MAX	0.1 10.0	0 2.0	0 1.0	0 1.0	0 1.0	0 4.0
4 CHAPARRAL (6 feet)	MIN MAX	1.1 21.0	0 2.0	0 1.0	0 1.0	0 1.0	0 4.0
5 BRUSH (2 feet)	MIN MAX	1.1 11.0	0 2.0	0 1.0	0 1.0	0 1.0	0 4.0
6 DORMANT BRUSH - HARDWOOD SLASH	MIN MAX	1.1 11.0	0 2.0	0 1.0	0 1.0	0 1.0	0 4.0
7 SOUTHERN ROUGH	MIN MAX	0.2 1.5	0.2 4.0	0 2.0	0 2.0	0 2.0	0 4.0
8 CLOSED TIMBER + LITTER	MIN MAX	0 1.0	0.1 4.0	0 3.0	0 12.0	0 2.0	0 4.0
9 HARDWOOD LITTER	MIN MAX	0 2.0	0.1 3.5	0 .5	0 10.0	0 10.0	0 4.0
10 TIMBER (Litter + Understory)	MIN MAX	0.5 1.0	2.0 5.0	0.1 5.0	1.0 15.0	1.0 22.0	0 4.0
11 LIGHT LOGGING SLASH	MIN MAX	0 2.0	2.0 7.0	1.0 6.0	1.0 15.0	1.0 50.0	0 4.0
12 MEDIUM LOGGING SLASH	MIN MAX	0 3.0	2.0 18.0	1.0 16.0	1.0 20.0	1.0 100.0	0 4.0
13 HEAVY LOGGING SLASH	MIN MAX	0 3.0	2.0 29.0	1.0 28.0	1.0 40.0	1.0 200.0	0 4.0

REF: Aids to Determining Fuel Models for Estimating Fire Behavior

Intermountain Forest and Range Experiment Station
GTR INT-122 NFES #1574

APPENDIX H

INCIDENT STATUS SUMMARY REPORT (ICS-209)

FOR

BIG OAKS NATIONAL WILDLIFE REFUGE

APPENDIX G

INCIDENT STATUS SUMMARY

(See reverse for general instructions)

1. Date	Time	2. INITIAL ☐ UPDATE ☐ FINAL ☐	3. Incident Name (12)	4. Incident Number (8)

5. Incident Commander (12)	6. Jurisdictions (5)	7. County (14)	8. Type Incident (20)	9. Location (64)	10. Started Date / Time (6/4)

11. Cause (28)	12. Area Involved (28)	13. % Contained (4)	14. Expected Containment Date / Time (6/4)	15. Ext. Control Date / Time (6/4)	16. Declared Controlled Date / Time (6/4)

17. Current Threat (66)	18. Current Problems (64)

19. Est. Loss (12)	20. Est. Savings (12)	21. Injuries (4)	Deaths (4)	22. Line Built (6)	23. Line to Build (6)

24. Current Weather WS / WD / Temp / RH (14)	25. Predicted Weather WS / WD / Temp / RH (14)	26. Costs to Date (12)	27. Est. Total Cost (12)

	28. AGENCIES																				
29. RESOURCES (4)																					**TOTALS**
KIND OF RESOURCE	**SR**	**ST**	**SR**	**ST**	**SR**	**ST**	**SR**	**ST**	**SR**	**ST**	**SR**	**ST**	**SR**	**ST**	**SR**	**ST**	**SR**	**ST**	**SR**	**ST**	
ENGINES																					
DOZERS																					
CREWS																					
HELICOPTERS																					
AIR TANKERS																					
TRUCK COS.																					
RESCUE/MED.																					
WATER TENDERS																					
OTHER																					
OVERHEAD PERSONNEL																					
TOTAL PERSONNEL																					

30. Cooperating Agencies (52)

31. Remarks (8 Lines/80)

32. Prepared By (12)	33. Approved By (12)	34. Sent To Date / Time / By

NFES 1333 9/86 ICS 209

APPENDIX G

GENERAL INSTRUCTIONS

Completion of the Incident Status Summary will be as specified by Agency or municipality. Report by telephone, teletype, computer, or facsimile to the local Agency or municipality headquarters by 2100 daily on incidents as required by Agency or municipality (reports are normally required on life-threatening situations, real property threatened or destroyed, high resource damage potential, and complex incidents that could have political ramifications). Normally wildland agencies require a report on all Class D (100 acres plus) and larger incidents (unless primarily grass type in which case report Class E, 300 acres or larger). The first summary will cover the period from the start of the incident to 2100 the first day of the incident, if at least four hours have elapsed; thereafter, the summary will cover the 24-hour period ending at 1900 (this reporting time will enable compilation of reporting data and submission of report to local Agency or municipality headquarters by 2100) daily until incident is under control. Wildland fire agencies will send the summary to the National Interagency Fire Center by 2400 Mountain Time.

1. Enter date and time report completed (mandatory).
2. Check appropriate space (mandatory-no computer entry).
3. Provide name given to incident by Incident Commander or Agency (mandatory).
4. Enter number assigned to incident by Agency (mandatory).
5. Enter first initial and last name of Incident Commander (optional).
6. Enter Agency or Municipality (mandatory).
7. Enter County where incident is occurring (optional).
8. Enter type incident, e.g., wildland fire (enter fuel type), structure fire, hazardous chemical spill, etc. (mandatory).
9. Enter legal description and general location. Use remarks for additional date if necessary (mandatory).
10. Enter date and zulu time incident started (mandatory - maximum of 6 characters for date and 4 characters for time).
11. Enter specific cause or under investigation (mandatory).
12. Enter area involved, e.g., 50 acres, top three floors of building, etc. (mandatory).
13. Enter estimate of percent of containment (mandatory).
14. Enter estimate of date and time of total containment (mandatory).
15. Enter estimated date and time of control (mandatory).
16. Enter actual date and time fire was declared controlled (mandatory).
17. Report significant threat to structures, watershed, timber, wildlife habitat, or other valuable resources (mandatory).
18. Enter control problems, e.g., accessibility, fuels, rocky terrain, high winds, structures (mandatory).
19. Enter estimated dollar value of total damage to date. Include structures, watershed, timber, etc. Be specific in remarks (mandatory).
20. Enter estimate of values saved as result of all suppression efforts (optional).
21. Enter any serious injuries or deaths which have occurred since the last report. Be specific in remarks (mandatory).
22. Indicate the extent of line completed by chains or other units of measurement (optional).
23. Indicate line to be constructed by chains or other units of measurement (optional).
24. Indicate current weather conditions at the incident (mandatory).
25. Indicate predicted weather conditions for the next operational period (mandatory).
26. Provide total incident cost to date (optional).
27. Provide estimated total cost for entire incident (optional).
28. List agencies which have resources assigned to the incident (mandatory).
29. Enter resource information under appropriate Agency column by single resource or strike team (mandatory).
30. List by name those agencies which are providing support, e.g., Salvation Army, Red Cross, Law Enforcement, National Weather Service, etc. (mandatory).
31. The Remarks space can be used to (1) list additional resources not covered in Section 28/29; (2) provide more information on location; (3) enter additional information regarding threat control problems, anticipated release or demobilization, etc. (mandatory).
32. This will normally be the incident Situation Unit Leader (mandatory).
33. This will normally be the incident Planning Section Chief (mandatory).
34. The ID of the Agency entering the report will be entered (optional - no computer entry).

FOR THOSE AREAS USING EXISTING COMPUTER SYSTEM REFER TO USER'S MANUAL

Maximum munber of characters allowed for each block are specified in parenthesis on front of form.

APPENDIX I

FIRE DISPATCH PLAN

BIG OAKS NATIONAL WILDLIFE REFUGE

APPENDIX I

Big Oaks National Wildlife Refuge
Fire Dispatch Plan

When report of smoke or fire is received get as much information form the caller as possible:

Location of smoke or fire:_____

Location of caller:_____
Name and telephone number of caller:_____

Color of smoke:_____
Size of Fire:_____
Type of fuel:_____

Character of the fire (running, smoldering, etc.):_____
_____
Is anyone fighting the fire?:_____

Did they see anyone in the vicinity or vehicles leaving the area?:_____

Weather at fire location:_____
_____

1. Check map location of fire and determine ownership/protection status.

2. Notify New Marion Fire Department.

3. If fire is on Refuge or threatening Refuge, immediately dispatch appropriate personnel and two vehicles (at least one 4x4) equipped with slip-on pumper, hand tools, and mobile radios to site of the fire.

4. Notify Project Leader or Acting Project Leader.

5. Maintain a log of all radio and telephone communications.

6. Remain on duty and dispatch additional assistance as ordered from the fire. See following support items.

7. Notify Indiana State Police (812-689-5000) if smoke development appears to threaten visibility along area highways.

APPENDIX I

8. Dispatch Refuge personnel to secure the area near the fire from Refuge visitors and curious onlookers.

Refuge Personnel

	Office	Home
Lee Herzberger, Refuge Manager	812-522-4352	812-522-1860
Joe Robb, Refuge Operations Specialist	812-273-0783	812-265-6633
Steve Miller, Refuge Operations Specialist	812-273-0783	812-358-4413
Jason Lewis, Wildlife Biologist	812-273-0783	812-574-6015
Teresa Vanosdol-Lewis, Wildlife Biologist	812-273-0783	812-574-6015

New Marion Volunteer Fire Department

Reporting Fires - Ripley County Dispatch	812-689-5500
Charles Meisberger	812-689-5774

Regional Fire Management Coordinator (RFMC)

Meredith Weltmer	612-713-5445

Fire Management Officer (FMO)

Tom Zellmer	218-449-4115 ext 212

Other Services

Kings Daughters Hospital	812-265-5211
IN Department of Transportation	
Versailles	812-689-5788
Madison	812-273-2240
Indiana State Police (Versailles)	812-689-5000
Ripley Co. Sheriff	812-689-5555
Jefferson Co. Sheriff	812-265-2648
Jennings Co. Sheriff	812-346-5111

APPENDIX J

GO/NO GO CHECKLIST

APPENDIX J

GO-NO-GO CHECKLIST

___	YES	___	NO	Do you have an APPROVED prescribed fire plan?
___	YES	___	NO	Are ALL fire prescription elements met?
___	YES	___	NO	Are ALL smoke management specifications met?
___	YES	___	NO	Are ALL permits and clearances obtained?
___	YES	___	NO	Has an area spot weather forecast been obtained and is it favorable?
___	YES	___	NO	Are ALL required personnel in the Prescribed Fire Plan on-site?
___	YES	___	NO	Has the contingency planning process adequately considered fuels adjacent to and within a reasonable proximity to the burn area?
___	YES	___	NO	Has the availability of ALL contingency resources been checked, and are they available?
___	YES	___	NO	Have ALL personnel been briefed on the project objectives and their assignment?
___	YES	___	NO	Have ALL personnel been briefed on their safety hazards, escape routes, and safety zones?
___	YES	___	NO	Have ALL the required notification been made?
___	YES	___	NO	Are the on-site holding forces adequate for containment under the expected conditions?
___	YES	___	NO	In YOUR OPINION, can the prescribed fire meet the planned objectives, and can it be carried out according to the approved plan?

I certify that I have reviewed the burn objectives and have reviewed, I am in agreement that the Prescribed Fire Complexity Analysis is correct, and that all the above questions were answered "YES".

_____ _____

Prescribed Fire Burn Boss **Date**

_____ _____

Refuge Manager **Date**

APPENDIX K

U.S. FISH AND WILDLIFE SERVICE

ENVIRONMENTAL ASSESSMENT

BIG OAKS NATIONAL WILDLIFE REFUGE
Jefferson, Jennings, & Ripley Counties, Indiana

FIRE MANAGEMENT PLAN

U.S. Fish and Wildlife Service
1661 W JPG Niblo Road
Madison, Indiana 47250

March 2001

APPENDIX K

ENVIRONMENTAL ASSESSMENT

BIG OAKS NATIONAL WILDLIFE REFUGE

FIRE MANAGEMENT PLAN

TABLE OF CONTENTS

APPENDIX K

APPENDIX K

I. PURPOSE AND NEED

A. Purpose

Policy of the U.S. Department of the Interior states that managers of refuge lands with vegetation capable of sustaining fire will develop a fire management plan (FMP) (910 DM 1). The Fish and Wildlife Service's Fire Management Handbook (621 FW 1.4-5) states that, "Every area with burnable vegetation must have an approved Fire Management Plan." This Environmental Assessment (EA) explores the various alternatives in which Service policy can be carried out, consistent with agency direction and analyzes the foreseeable impacts associated with an integrated fire management program.

This EA has been developed to evaluate environmental consequences of the FMP being created for the newly established Big Oaks National Wildlife Refuge. The FMP is one of many step-down plans that build upon management actions adopted in the Refuge's Interim Comprehensive Conservation Plan (CCP). The Interim CCP designates 2 Grassland Focus Areas, comprising 16,000 acres, where prescribed burning is the preferred method of maintaining early successional habitats including grasslands (Interim CCP 1.8 and Figure 4). The Interim CCP declares that wildland fire suppression needs will be outlined in the FMP (Interim CCP 1.9). This FMP is further necessary to meet Service, Departmental and National policy mandates concerning fire management.

B. Need

The FMP for the Refuge has been developed to provide direction and continuity in establishing operational procedures to guide all fire management activities. The Refuge FMP is needed to guide us while implementing resource management objectives as defined in our interim management document titled *Interim Comprehensive Conservation Plan for Big Oaks National Wildlife Refuge*. The FMP will be updated as needed to comply with all permanent management plans as they are developed for this new Refuge. The Refuge does not currently have a FMP.

The goal of this FMP and the Alternatives developed is the management of wildland fire to:

a. Provide for the protection of life and property.
b. Provide for protection of habitats required by endangered and threatened species.
c. Implement a safe and cost effective program of resource protection and enhancement.
d. Reduce hazardous fuels; and protect native biotic communities.

The alternatives detailed in this document will accomplish these goals to varying degrees.

APPENDIX K

C. Decisions that Need to be Made

Through public and staff input, the Regional Director (Region 3) of the Fish and Wildlife Service must decide whether to select the preferred alternative (Proposed Action) or one of the other alternatives as presented in this EA or to select an entirely new alternative that was not developed for this EA. The Regional Director must then decide whether the selected alternative is at a significance level that requires an Environmental Impact Statement be developed or whether a Finding of No Significant Impact (FONSI) determination can be made.

D. Background

Big Oaks NWR was established on June 30, 2000, as an overlay refuge on approximately 50,000 acres north of the historic firing line of the former Jefferson Proving Ground. Through a real estate permit from the Department of the Army, the Service maintains Big Oaks NWR as habitat for endangered species, migratory birds and other wildlife in order to further the purposes of the Endangered Species Act and the Fish and Wildlife Act.

The wide array of both resident and migratory species found on the Refuge is due to the varied habitat types found in the grassland/forest/wetland complex. The mix of forests, grasslands, forested wetlands, emergent marsh, and early successional stages of vegetation all contribute to the species diversity of the wildlife community found at the Refuge. Fire is a critical ecological process in maintenance of successional habitats required by many species of wildlife that are of management concern within the Region.

The value of early successional habitat within the Refuge has been recognized at both the state and national levels. The Refuge has been named a Globally Important Bird Area by the American Bird Conservancy due to large Henslow's sparrow populations within the Refuge's grassland areas.

All alternatives considered within this EA deal with various combinations of 3 fire types; human-caused wildland fires, naturally occurring wildland fires and management ignited prescribed fires. Under all alternatives discussed within this EA, all human-caused wildland fires and all escaped management ignited prescribed fires will be suppressed. The following definitions are used throughout this document.

Suppression - All the work of extinguishing or confining a fire beginning with its discovery.

Management Ignited Prescribed Fire - Fire intentionally ignited to accomplish management objectives in specific areas under prescribed conditions identified in an approved Prescribed Fire Plan.

APPENDIX K

Naturally Ignited Wildland Fire - Fire ignited by natural means (usually lightning) which is permitted to burn under specific environmental conditions, in preplanned locations, with adequate fire management personnel and equipment available to achieve natural ignition fire patterns.

Appropriate Management Response - The specific actions taken in response to a wildland fire to implement protection and/or fire use objectives.

Past use history of the Refuge by the Army, as a munitions testing area, has lead to the contamination of many areas of the Refuge by unexploded ordnance (UXO) and depleted uranium (DU) a radioactive material used for testing. All areas of the Refuge are considered contaminated by UXO or DU and all UXO and DU safety measures outlined in this EA must be followed. While the complete health affects of burning in areas containing DU and other contaminants are unknown, current scientific evidence available suggests that DU is not readily dispersed through fire and that the exposure level is an order of magnitude lower than the U.S. Environmental Protection Agency action level (Williams et. al. 1998). Safety measures in place to avoid UXO hazards are more restrictive than safety measures advised for DU and other contaminants. At all times we will utilize the more restrictive UXO safety measures.

Suppression options are limited on the refuge due to the past use-history of munitions testing by the Army. All areas of the refuge may contain UXO and earth disturbing activities are generally prohibited. Certain areas of the Refuge contain DU, a radioactive material which was used by the Army during testing. Due to these contaminants, full suppression can only occur along the boundary of the refuge. The following definitions are the terms used to identify appropriate suppression responses:

Confine - To restrict the wildland fire within determined boundaries, established either prior to or during the fire. These identified boundaries will confine the fire with no direct action being taken to extinguish the fire. *At Big Oaks NWR no ground-disturbing methods can be used to implement the **Confine** strategy, except along the perimeter of the refuge, due to the presence of UXO and DU.*

Contain - To restrict a wildland fire to a defined area using a combination of natural and constructed barriers that will stop the spread of the fire under the prevailing and forecasted weather conditions until it is out. *At Big Oaks NWR no ground-disturbing methods can be used to implement the **Contain** strategy, except along the perimeter of the refuge, due to the presence of UXO and DU.*

Control - To aggressively fight a wildland fire through the skillful use of personnel, equipment, and aircraft to establish firelines around a fire, halt the fire's spread, and

extinguish all hot spots until the fire is completely out. This strategy is an effective technique to achieve prompt control of a wildland fire. *At Big Oaks NWR no ground-disturbing methods can be used to implement the* ***Control*** *strategy, except along the perimeter of the refuge, due to the presence of UXO and DU.*

II. ALTERNATIVES

A. Alternatives not Considered for Detailed Analysis

An alternative of allowing all fires to burn at all times was initially considered but eventually dismissed as not suitable for further consideration in the development of this proposal. This alternative was rejected because it fails to meet U.S. Fish and Wildlife Service policy in regards to potential liability for losses of life and property, as well as unacceptable environmental, social, and economic costs.

B. Alternatives Carried Forward for Detailed Analysis

1. Alternative A - Management Ignited Prescribed Fire and Appropriate Management Response to Wildland Fire - The Proposed Action

This Alternative would allow the Refuge to utilize a full range of fire management tools. Management ignited prescribed fires would be used by managers to reduce fuel hazards, simulate natural fire processes, and enhance opportunities for management of prescribed natural fires. This alternative strives to maintain the 8,000 acres of grassland and 6,000 acres of other early successional habitats that currently exist within Big Oaks NWR. Suppression would occur on all fires during the period April 15 through September 15 to avoid direct impacts to Federally endangered *M. sodalis*. Known cultural resources would be protected under this and all other Alternatives.

Under this alternative all human-caused wildland fires would be suppressed. All naturally ignited wildland fires would be allowed to burn depending on the appropriate management response developed from analysis of the local situation, values-to-be-protected, management objectives, external concerns, and refuge objectives when the fire occurs. Suppression would be undertaken on naturally ignited wildland fires that threaten life, property, resources or exceed prescription limits developed for that fire. No prescribed fires will be ignited this year (2001) within any portion of the DU area.

2. Alternative B - Full Suppression - No Action

The Refuge is abiding by current Departmental and Service policies that require full suppression of all wildland fires and preclude management ignited prescribed fires for all refuges without an approved FMP. Under this alternative all ignitions, including those of both natural and human-caused origin, would be suppressed and no management prescribed fires would be conducted. This Alternative summarizes actions that the Refuge would take until we have an approved FMP (No Action Alternative).

Under this alternative all ignitions, including those of both natural and human-caused origin, would be suppressed and no management prescribed fires would be conducted. Hazard fuel reduction would be accomplished by mechanical methods to the extent practical and consistent with land management objectives. No management ignited prescribed fires would be initiated under this Alternative and therefore no management ignited prescribed fires would occur this year (2001) within the DU area. Mechanical manipulation on the Refuge would be limited to interior roadway and Refuge boundary maintenance and protection due to UXO and DU safety concerns. As with all other Alternatives, suppression would occur on all fires during the period April 15 through September 15 to avoid direct impacts to Federally endangered *M. sodalis*. Known cultural resources would be protected under this and all other Alternatives.

3. Alternative C - Management Ignited Prescribed Fire and Fire Suppression

This Alternative, like Alternative A, would enable the Refuge to use prescribed fires in pre-determined areas, within pre-planned conditions, to accomplish specific resource management objectives. Fire hazards around Refuge boundaries would be reduced under this alternative. This Alternative differs from Alternative A in that all wildland fires would be suppressed regardless of cause or location.

Like Alternative A, this Alternative strives to maintain the 8,000 acres of grassland and 6,000 acres of other early successional habitats that currently exist within Big Oaks NWR. As with all other Alternatives, suppression would occur on all fires during the period April 15 through September 15 to avoid direct impacts to Federally endangered *M. sodalis*. Known cultural resources would be protected under this and all other Alternatives. Suppression would occur on all fires during the period April 15 through September 15 to avoid direct impacts to Federally endangered *M. sodalis*. No prescribed fires will be ignited this year (2001) within any portion of the DU area.

APPENDIX K

III AFFECTED ENVIRONMENT

A. Physical Characteristics

The area has a typical midwestern continental climate and the weather is quite variable, because of the influx of high and low pressure systems and warm moist air from the Gulf of Mexico. Summers are generally quite warm, while the winters are moderately cold. Precipitation is fairly uniform throughout the year, averaging 3 - 4 inches per month. Spring and summer thunderstorms push the monthly average over 4 inches for the March-June period, while the fall of the year sees monthly rainfalls close to 3 inches Measurable snowfall can be experienced throughout the November to March period, and averages about 15 inches annually.

Ground elevations at the Refuge are generally between 850 - 900 feet Net Geodetic Vertical Datum, with elevations along the numerous streams flowing through the area being about 30 - 50 feet lower. Site drainage is generally to the west and southwest.

B. Biological Resources

1. Habitat/Vegetation

The following habitat types were derived from 1995 and 1997 aerial photos. Photo interpretation was completed in 1998. Classifications are comparable to those used in the US GAP Analysis Project. Individual classifications were based on a minimum detection size of 5 acres. The distinction between forest and woodland is based on the amount of canopy closure. Forest areas have 60% or greater canopy closure and woodlands have 20% to 40% canopy closure.

Upland forests comprise 27,300 acres (54%) of the Refuge. The upland forest classification includes both evergreen and deciduous species ranging in age from young (~15-30 years) to mature (>50 years). The primary evergreen species at the Refuge is eastern red cedar (*Juniperus virginiana*). Dominant deciduous trees include sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*) and black gum (*Nyssa sylvatica*) on poorly drained upland depression sites. Tulip poplar (*Liriodendron tulipifera*) and white ash (*Fraxinus americana*) are the species making up the young upland forests on well drained sites. White oak (*Quercus alba*), red oak (*Quercus rubra*) and shagbark hickory (*Carya ovata*) are the dominant species on intermediate and within some mature

upland forests. American beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*) dominate the remainder of the mature upland forests.

Our second most abundant habitat at the Refuge is grasslands. This habitat type makes up 8,400 acres (17%) of the Refuge. The dominant grassland species at the Refuge appears to be broomsedge (*Andropogon* sp.).

Other habitat types at the refuge include 5,200 acres (10%) palustrian wetland, 3,100 acres (6%) woodland, 6,100 acres (12%) early successional, 150 acres (0.5%) of open water, and approximately 150 acres (0.5%) of bare soil and paved areas. Woodland species composition is comparable to that of upland forest. The palustrine wetland category includes all growth stages of palustrine vegetation including early successional and forested wetland.

2. Threatened, Endangered and Candidate Species

Big Oaks NWR is used as summer habitat by federally endangered Indiana bats (*Myotis sodalis*). Mist netting efforts by Service personnel have documented use of all riparian corridors within the Refuge by *M. sodalis* and all areas of the Refuge are considered summer habitat of *M. sodalis*.

Big Oaks NWR is within the range of the federally threatened bald eagle (*Haliaeetus leucocephalus*). *H. leucocephalus* have previously utilized the refuge as a wintering area. No *H. leucocephalus* are known to nest or utilize the Refuge during the breeding season. All riparian and lacustrine, palustrine and riverine and adjacent habitats would be considered suitable for *H. leucocephalus*.

3. Other Wildlife Species

The Refuge provides habitats for, and subsequently attracts, an abundance of wildlife species. Twenty-two species of amphibians, 17 species of reptiles, 46 species of mammals, and over 200 species of birds have either been recorded or can reasonably be expected to be present on the Refuge for a portion of the year.

APPENDIX K

C. Land Use

The Refuge is situated on over 50,000 acres in southeastern Indiana within Jefferson, Ripley and Jennings Counties. The nearest communities are Madison, Indiana, about 5 miles south of the southern boundary of the refuge, and Nebraska and Holton, Indiana, about 1 mile north of the northern site boundary. Land use within the 3 county's 758,000 acre area is predominantly agriculture (67%).

D. Cultural/Paleontological Resources

Several Native American groups including the Miami, Wea, Piankawhaw, and Shawnee inhabited eastern Indiana, where they lived in summer agricultural villages and winter temporary hunting/trapping camps. Later arrivals in the area included the Delaware, Potawatomi, and Kickapoo groups (Stafford 1985:2-15). The Delaware and the Potawatomi are reported to have occupied the land east of Butlerville in Jennings County (Leland et al. 1956:89) that is today part of Big Oaks NWR (Mbutu et. al. 1996). Artifacts attesting to use of the area by Native Americans can be found on the Refuge (U.S. Army 1996).

Euro-American settlement of Big Oaks NWR and its vicinity can be traced back to about 1811 (Baker 1991:7). The earliest Euro-American families in Jefferson, Jennings, and Ripley counties were subsistence farmers. Subsistence farming remained the principal occupation during the early half of the nineteenth century. The portions of Jefferson, Jennings, and Ripley counties which the Refuge now occupies had consisted of an area of dispersed farmsteads, schools, churches, cemeteries, and small crossroad communities. Artifacts documenting this use are quite evident on the landscape of the Refuge today.

E. Local Socio-economic Conditions

The population within the three counties totaled 78,074 based on the 1990 census. From 1990 to 1999, population increased an estimated 12% to 87,394 within the 3 county area. Land use within the 3 county's 306,914 ha area is predominantly agriculture (67%). In 1989, the primary employment sector was manufacturing followed by government, retail trade and services sectors.

APPENDIX K

IV ENVIRONMENTAL CONSEQUENCES

A. Alternative A - Management Ignited Prescribed Fire and Appropriate Management Response to Wildland Fire (Proposed Action)

1. Soil and Water Resources

Implementation of this alternative would seek to minimize impacts on soil and water resources by controlling the area, timing, and intensity of management ignited prescribed fires but these impacts could not be totally eliminated. Areas of extreme fuel concentrations would be reduced under this alternative which would, in turn, decrease the likelihood of extreme fire events. Short-term impacts from management ignited prescribed fires would be greater for this alternative compared to Alternative B and the same as Alternative C. Long term impacts to soil and water impacts would be the same among all Alternatives.

2. Vegetation and Fuels

Under this alternative management ignited prescribed fires could help maintain vegetation communities and reduce accumulations of fuels which contribute to larger fires. The natural ignition pattern of fire on the landscape would likely resemble a more systematic pattern. Naturally ignited wildland fires would be allowed to occur provided sufficient resources are on hand to provide for the safety and protection of property and personnel.

In vegetation around sensitive resource areas, prescribed burning could be used to simulate the effects of natural fire. The impacts of tactical suppression operations would be similar under all alternatives. Due to the safety hazards associated with UXO and DU, suppression actions would primarily be limited to the use of natural features, roads and backing fires.

3. Wildlife

Under this alternative, conditions favorable to fire dependent wildlife species would be simulated but not in the exact manner created by natural ignitions. The use of management ignited prescribed fires would lessen the build-up of fuels and lessen the intensity of all

wildland fire types (natural or human-ignited). The distribution of habitat types, and the wildlife species that depend on these habitats, would be determined by management ignited prescribed fire location, timing, conditions, and patterns of burning and only infrequently (every 50-100 years) by naturally ignited wildland fires. Prescribed fire could be implemented to stimulate plant growth, remove non-native plant species, and eliminate downed fuels.

4. Endangered and Threatened Species

The effects of all Alternatives on federally endangered and threatened species has been evaluated in an Endangered Species Act section 7 consultation with the Bloomington, Indiana Ecological Service's Office. Initial indications are that management ignited prescribed fires under all Alternatives could be designed to avoid direct impacts to *M. sodalis*. This would by achieved by suppressing all fires between April 15 and September 15. Management ignited prescribed fires would actually improve *M. sodalis* maternity roost habitat. *M. sodalis* prefer large trees in the open or at edges, they seem to prefer open canopies and fragmented forest landscapes and they seem to prefer forests with an open understory (USFWS 1999). These are conditions that would be found in a fire altered landscape. No impacts to *H. leucocephalus* are anticipated. The effects of suppression activities on endangered and threatened species would be similar with all alternatives due to the limited disturbance imposed by UXO and DU safety considerations.

5. Cultural Resources

Known cultural resources would be protected under this and all other Alternatives. Two historic structures adjacent to, and surrounded by, the Refuge are not likely be effected in all but the most extreme fire situation. The use of management ignited prescribed fires under this Alternative would reduce fuels and lessen the chance of an extreme fire occurring. The effects of suppression activities on cultural resources would be avoided under this and all other Alternatives evaluated due to the limited disturbance imposed by UXO and DU safety considerations.

6. Visual/Aesthetics/Air Shed

This alternative could result in the greatest range of impacts on visual resources as a result of the various levels of fire intensity that could occur during a naturally ignited wildland fire. The appropriate management response to a naturally ignited wildand fire would consider visual, aesthetic and airshed impacts at the time of the initial incident and at each subsequent evaluation.

Under this Alternative, effects of management ignited prescribed fires could be controlled. Short term smoke episodes would still be possible under this alternative, but fuels reduction through management ignited prescribed fires would greatly reduce episodes of severe air pollution due to large, uncontrolled wildland fires. Given the limited range of suppression options available due to UXO and DU safety constraints, visual impacts from suppression activities would be very minor and similar under all Alternatives.

7. Visitor Use/Safety

This alternative provides for the most natural habitats for visitor use. Due to timing of fire occurrence and conditions effecting fire behavior, visitors at certain times and Refuge neighbors could be inconvenienced. Initial safety hazards are lower under this alternative than under either Alternative B or C because of reduced direct exposure of firefighters to possible UXO and DU contamination. Hazards would still be encountered while performing suppression duties due to direct flame exposure, respiratory problems associated with smoke inhalation, and the use of equipment under conditions of poor visibility.

8. Economic

Reduction of hazardous fuels near structures and other capital improvements would reduce potential economic losses from a catastrophic fire. Use of management ignited prescribed fires would minimize the risk of escaped fires due to the preplanning process associated with prescribed burning. Costs of management ignited prescribed fires is comparable to Alternative C. By utilizing the appropriate management response, for naturally ignited wildland fires, the cost of wildland fire suppression would likely be lower than suppression costs in Alternative B or C. No direct or indirect economic impact (positive or negative) to the surrounding communities is anticipated with this or any other Alternative considered.

APPENDIX K

9. Cumulative Impacts

When reviewing the effects of a fire management program we must consider not only the effects of burning efforts at Big Oaks NWR but also the combined effects on the environment of all burning and other sources of particulate matter and overall impacts to habitats throughout the region. Cumulative impacts of the implementation of this Alternative on air quality in Indiana are minimal. No area within the region is a non-attainment air quality area and none are likely to be directly or indirectly effected to approaching a level of significance needing to be addressed .

No cumulative loss of early successional habitats or contiguous forest would result at Big Oaks NWR or within the state or region from implementation of this Alternative. This alternative strives to maintain the 8,000 acres of grassland and 6,000 acres of other early successional habitats that currently exist within Big Oaks NWR.

B. Alternative B - Full Suppression (No Action)

1. Soil and Water Resources

Impacts on water quality would be negligible with low intensity fires. Over time, with the build-up of fuels, the chance of a severe fire would increase. In the event a high intensity fire did occur, an increase in surface runoff leading to soil erosion and siltation could be expected. The long-term impacts to soil and water resources is estimated to be comparable among all Alternatives considered.

2. Vegetation and Fuels

This alternative could create an unnatural increase in fuel conditions leading to increased potential for larger wildland fires with greater intensities. The elimination of frequent, light-burning fires would change the composition of vegetation and allow the hazardous build-up of combustible fuels. This could result in more extreme burning conditions in which wildland fires become larger and more dangerous. Over time, as the present early successional vegetation is replaced by mature forest, fire behavior would be expected to decrease. Full suppression without the inclusion of management ignited prescribed fires would reduce species diversity by excluding fire dependent, shade intolerant species. The effects of suppression efforts on vegetation and fuels would be similar to Alternatives A

and C since UXO and DU safety considerations would prevent intensive suppression efforts on areas of the Refuge other than the perimeter.

3. Wildlife

Species dependent upon fire influenced ecosystems could decline and be replaced by species more tolerant of conditions created when fire is removed as an ecological process. Due to UXO and DU safety considerations, the effect of suppression impacts would be similar among all Alternatives.

4. Endangered and Threatened Species

The effects of all Alternatives on federally endangered and threatened species is currently being reviewed in an Endangered Species Act section 7 consultation with the Bloomington, Indiana Ecological Service's Office. This consultation is being conducted concurrently with the drafting of this EA. No impacts to *H. leucocephalus* are anticipated. The effects of suppression activities on endangered and threatened species would be similar with all alternatives due to the limited disturbance imposed by UXO and DU safety considerations.

Fires under all Alternatives would be suppressed between April 15 and September 15 to avoid direct impacts to *M. sodalis*. Management ignited prescribed fires are designed to improve *M. sodalis* maternity roost habitat. Suppression of all fires and removal of management ignited prescribed fires would alter the landscape over time creating a more closed forest system without the open understory and openings preferred by *M. sodalis*. Adoption of this Alternative would lead to indirect impacts occurring to *M. sodalis*.

5. Cultural Resources

The limited use of earth-disturbing suppression activities due to UXO and DU contamination would likely significantly reduce or eliminate impacts to cultural resources. Cultural resources susceptible to damage by fire could be degraded by high intensity fires beyond the ability of suppression forces to control or within areas where the suppression cannot go due to UXO and DU safety considerations. High intensity fires are more likely to occur under this alternative due to the accumulation of dead vegetation and downed woody materials (excess fuels) as a result of total fire suppression.

6. Visual/Aesthetics/Air Shed

This alternative eliminates short term effects such as scorching of vegetation that result from smaller, and more frequent prescribed fires. Infrequent high intensity fires which could occur over time would result in considerable changes in the appearance of affected areas. Under this alternative there would be a short term reduction in the generation of particulate emissions from fires because of control actions. However, there is the potential for severe episodes of air pollution due to large, uncontrolled wildland fires.

7. Visitor Use/Safety

There are minimal appreciable short term impacts on Refuge visitor use under this alternative. Visitor interpretation of the Refuge would be influenced by the unnatural composition of Refuge habitats. Open areas could be potentially closed to visitor use and access during suppression activities. Wildland fire suppression is hazardous by nature. The inherent safety risks associated with small fires are compounded on larger, high

intensity fires, not only for firefighters, but for the public as well. Hazards include direct flame exposure, respiratory problems associated with smoke inhalation, and the use of equipment under conditions of poor visibility.

8. Economic

Reduction of hazardous fuels near structures and other capital improvements through the use of management ignited prescribed fires would not occur under this Alternative. Due to the build-up of hazardous fuels, the threat to capital improvements would be greater under this alternative than under either Alternative A or C. Costs associated with the suppression program steadily increase with the accumulation of fuel. High intensity fires potentially would be costly to suppress and could cause economic disruption through the loss of natural resources, capital improvements, visitor access opportunities, and deteriorated visitor experiences. The suppression program would be limited by the presence of UXO and DU contamination. This would reduce the ability of firefighters to directly attack the fire and require more costly aerial suppression. No direct or indirect economic impact (positive or negative) to the surrounding communities is anticipated with this or any other Alternative.

9. Cumulative Impacts

When reviewing the effects of a fire management program at Big Oaks NWR combined with effects on the environment of all burning and other sources of particulate matter throughout the region, cumulative impacts are minimal. No area within the region is a non-attainment air quality area and none are likely to be directly or indirectly effected to approaching a level of significance needing to be addressed .

A significant increase in mature and contiguous forests would occur through time under this Alternative. Benefits to interior forest migratory birds and animals would likely occur over time.

Significant cumulative loss of early successional habitats and would occur. This alternative would lead to the loss of 8,000 acres of grassland and 6,000 acres of other early successional habitats that currently exist within Big Oaks NWR. This loss when combined with the over 99% reduction in native grasslands statewide is significant. Furthermore, it is likely that if these grasslands are lost, it may be necessary to re-evaluate the status of Henslow's sparrow under the Endangered Species Act. Therefore, if Alternative B were to become the selected Alternative, the Service would prepare an Environmental Impact Statement to analyze the impacts of this Alternative.

C. Alternative C - Management Ignited Prescribed Fire and Fire Suppression

1. Soil and Water Resources

Due to the low frequency of naturally ignited wildland fires (every 50-100 years) anticipated under Alternative A, water quality and soil resource impacts would be considered the same as Alternative A. Impacts from management ignited prescribed fires would also be the same as Alternative A.

2. Vegetation and Fuels

Impacts to vegetation and fuels would be similar to Alternative A, management ignited prescribed fires could help maintain historic vegetation communities and reduce

accumulations of fuels which contribute to larger fires. The impacts of tactical suppression operations against wildland fires would be similar to those described under Alternative A and B.

3. Wildlife

Fewer instances of human induced change would be imposed upon Refuge habitats compared to Alternatives B. Effects on wildlife would be the same as under Alternative A except that the natural ignition pattern of fire on the landscape would likely be replaced by a more systematic pattern with the exclusion of naturally ignited wildland fires. Due to UXO and DU safety considerations, the effect of suppression impacts would be similar among all Alternatives.

4. Endangered and Threatened Species

The effects of all Alternatives on federally endangered and threatened species is currently being reviewed in an Endangered Species Act section 7 consultation with the Bloomington, Indiana Ecological Service's Office. This consultation is being conducted concurrently with the drafting of this EA. Initial indications are that management ignited prescribed fires under this Alternative and under Alternative A could be designed to avoid direct impacts to *M. sodalis*. This would by achieved by suppressing all fires between April 15 and September 15. Management ignited prescribed fires would actually improve *M. sodalis* maternity roost habitat. *M. sodalis* prefer large trees in the open or at edges, they seem to prefer open canopies and fragmented forest landscapes and they seem to prefer forests with an open understory (USFWS 1999). These are conditions that would be found in a fire altered landscape.

No impacts to *H. leucocephalus* are anticipated. The effects of suppression activities on endangered and threatened species would be similar with all alternatives due to the limited disturbance imposed by UXO and DU safety considerations.

5. Cultural Resources

The scheduled nature of burning under this alternative provides the ability to plan, locate, and consequently avoid the disturbance of known cultural resources resulting from either ignition or fire control activities. Known cultural resources would be protected under this

and all other Alternatives. Two historic structures adjacent to, and surrounded by, the Refuge are not likely be effected in all but the most extreme fire situation. The use of management ignited prescribed fires under this Alternative would reduce fuels and lessen the chance of an extreme fire occurring. The effects of suppression activities on cultural resources would be avoided under this and all other Alternatives evaluated due to the limited disturbance imposed by UXO and DU safety considerations.

6. Visual/Aesthetics/Air Shed

Areas with sensitive visual resources could be protected from fire and certain fire suppression activities under this alternative. Some visual changes would occur under this alternative, but lower intensity management ignited prescribed fires would result in minimal changes to visual aesthetics. Alternatives A and C provides a slightly higher degree of air quality management owing to the ability to schedule management ignited prescribed fires to coincide with periods of acceptable smoke ventilation to minimize impacts to roadways and developed areas. The direction of wind vector selected will be such that smoke and other particulate emissions are transported away from sensitive areas. Short term smoke episodes would still be possible under this alternative, but fuel reduction through management ignited prescribed fires would greatly reduce episodes of severe air pollution due to large, uncontrolled wildland fires.

7. Visitor Use/Safety

This alternative may entail some disruptive effects to Refuge visitors. Operational activities could limit visitor use and access to open portions of the Refuge. Smoke production could detract from visual enjoyment and further restrict access on public roads and trails. Activities associated with management ignited prescribed fire can normally be accomplished in a safe manner through pre-planning and scheduling of work tasks. Fires are ignited in a predetermined pattern and are generally of low to moderate intensity. Hazards associated with suppression of wildland fires remain the same as those associated with Alternatives A and B.

APPENDIX K

8. Economic

Reduction of hazardous fuels near structures and other capital improvements would reduce potential economic losses from a catastrophic fire. Use of management ignited prescribed fires would minimize the risk of escaped fires due to the preplanning process associated with prescribed burning. Costs of management ignited prescribed fires is comparable to Alternative A. No direct or indirect economic impact (positive or negative) to the surrounding communities is anticipated with this or any other Alternative.

9. Cumulative Impacts

When reviewing the effects of a fire management program at Big Oaks NWR combined with effects on the environment of all burning and other sources of particulate matter throughout the region, cumulative impacts are minimal. No area within the region is a non-attainment air quality area and none are likely to be directly or indirectly effected to approaching a level of significance needing to be addressed .

Cumulative impacts for this alternative is the same as Alternative A. No cumulative loss of early successional habitats or contiguous forest would result at Big Oaks NWR or within the state or region from implementation of this Alternative. This alternative strives to maintain the 8,000 acres of grassland and 6,000 acres of other early successional habitats that currently exist within Big Oaks NWR.

APPENDIX K

D. Summary of Environmental Consequences by Alternative

	Alternative A (Proposed Action)	Alternative B (No Action)	Alternative C
Soil and Water Resources	Minor short-term impacts from prescribed fires	No short term impacts	Minor short-term impacts from prescribed fires
Vegetation and Fuels	No change from current condition is expected. A more natural landscape will result from natural wildland fires.	Gradual increase in size of vegetation and fuels and possible severe fire activity	No change from current condition is expected
Wildlife	No immediate change from current condition is expected. A more natural assemblage of species will result from natural wildland fires over time.	Gradual elimination of species that depend on early successional vegetation.	No change from current condition is expected
Endangered and Threatened Species	No change from current condition is expected	Gradual reduction in suitability of habitat for *M. sodalis*.	No change from current condition is expected
Cultural Resources	No change from current condition is expected	No change from current condition is expected	No change from current condition is expected
Visual/Aesthetics/ Air Shed	Impacts would be variable and unpredictable but not as extreme as Alternative B.	Periodic extreme fire events could cause impacts to visual/aesthetics/air shed.	No change from current condition is expected

APPENDIX K

	Alternative A (Proposed Action)	Alternative B (No Action)	Alternative C
Visitor Use/Safety	Greater safety to firefighting personnel than other Alternatives and no change in visitor use expected.	Increased risk to firefighting personnel but no change in visitor use expected.	Increased risk to firefighting personnel but no change in visitor use expected.
Economic	Lower risk to structures on the Refuge. No economic impact off Refuge.	Increased risk to Refuge structures due to build-up of dangerous fuels. No economic impact off Refuge.	Lower risk to structures on the Refuge. No economic impact off Refuge.
Cumulative Impacts	No change from current conditions.	Significant increase in contiguous forest. Significant reduction in valuable early successional habitats on the Refuge and across the state.	Same as Alternative A.

V. List of Preparers

Steve Miller, 1661 W JPG Niblo Rd. Madison, IN 47250

VI. Coordination and Consultation With the Public and Others

During the preparation of the Big Oaks NWR's FMP and this EA, consultation and coordination occurred between this office and numerous state and federal agencies. Endangered Species intra-Service Section 7 consultation was completed concurrently with the review of this EA by the public. The Intra-Service Section 7 Consultation is now complete and no changes were needed to the FMP or the EA.

APPENDIX K

Maintaining a good working relationship with various agencies in Indiana is essential to the overall fire management program. Throughout the planning stages of this document, the Service was in direct contact many organizations. The following agencies were given and asked to comment on preliminary drafts of the FMP and EA:

U.S. Army

U.S. Fish and Wildlife Service's Ecological Services Office at Bloomington, Indiana

Hoosier National Forest

Indiana Department of Natural Resources Division of Forestry

Indiana Air National Guard

New Marion Volunteer Fire Department

Through these contacts, during the planning and writing process, the Service was able to identify the concerns of these agencies and, where possible, incorporate their concerns and suggestions into this document.

This EA was made available for public comment from January 30 through March 1, 2001. We received one response from Save The Valley, Inc. and their letter is attached. Changes were made to this EA in response to their letter in order to clarify our actions. A summary of these changes is included in our response to their letter in Attachment 1. These changes were not considered significant and therefore a second draft of this EA was not made available for public comment prior to the final EA being adopted.

APPENDIX K

SECTION VII

Comments Received

SAVE THE VALLEY

SAVE THE VALLEY, INC., P.O. BOX 813, MADISON, IN 47250
phone & fax: (812) 265-4577; e-mail: phill@venus.net
Protecting the Ohio River Valley environment since 1974

February 26, 2001

Big Oaks National Wildlife Refuge
Attn: Steve Miller
1661 West JPG Niblo Road
Madison, IN 47250

Dear Mr. Miller:

We have read the recently released Big Oaks National Wildlife Refuge Fire Management Plan and accompanying Environmental Assessment and appreciate the opportunity to comment on the plan.

First, let me say that we at Save the Valley (STV) generally defer to the expertise of the U.S. Fish & Wildlife Service and its most competent employees at Big Oaks. The plan as outlined seems to us to be well thought out. It also seems that the proposed strategy would be the best selection to attain the stated goals and objectives. Additionally, we should say that we agree with those goals and objectives.

1 We do have one concern pertaining to the plan. This has to do with the intention to conduct prescribed burns in the area that contains depleted uranium (DU). As you probably know, STV is currently researching the potential hazards that this DU may present. In our consultation with experts in toxicology, radiation hazards, and risk assessment, we have been advised that one potential problem associated with DU is inhalation or ingestion of fine particles of DU (DU dust). While the greatest part of the DU at Big Oaks is contained in relatively large pieces (whole or nearly whole projectiles and relatively large fragments) there may be some DU dust present.

2 It is our opinion that burning in the DU area may cause some of this DU dust to become airborne. This dust could then be inhaled or ingested by F&WLS personnel and possibly even by other persons both on and off the Big Oaks site.

3 We would advise that prescribed burns in the DU area not be conducted, at least until more information becomes available. The issue of the possible results of burning within the DU area should be discussed during the DU License Termination process. Thus, the Nuclear Regulatory Commission (NRC) may ultimately advise whether or not such burning should be allowed.

4 Therefore, we would recommend that prescribed burning not be conducted in the DU area unless and until the health and safety risks of burning in the DU area are completely understood.

Sincerely,

Richard Hill
President, STV

APPENDIX K

Response to Comments

Save The Valley

1. Comment noted. Prior to including these areas within our management ignited prescribed fire areas, we reviewed data available on DU and DU/fire interactions and asked Fish and Wildlife Service environmental contaminant specialists to examine this same data. Based upon allowable exposure thresholds and data available on DU and DU/fire interactions it was determined that, even using conservative risk scenarios, fire was unlikely to increase DU exposure to fire personnel or the environment to a level approaching significance. Given this data and the fact that no new data was presented we have not changed our proposed burn boundaries.

2. We have included a citation (Williams et. al. 1998) in this final EA for a study on the dispersion and therefore possible human exposure of DU associated with fires. Current data available suggests that levels of DU carried in smoke associated with burning natural vegetation is not significant. This is the only study we know of that looks at dispersion of DU in smoke in a setting similar to the conditions that are found on the refuge. Exposure of fire personnel would be limited due to the safety constraints associated with UXO. Fire personnel leave the area immediately following ignition and then only return on a periodic basis for monitoring.

3. We have included text within the EA indicating that we are not proposing to conduct burns within the DU area this year (2001). Provided no new data is made available demonstrating a significant risk (or a risk approaching significance) to the public, fire personnel or the environment, we propose burning in areas containing DU in the future to maintain valuable habitat. The Service has requested that the U.S. Army and the Nuclear Regulatory Commission review the affects of fire and DU specifically for refuge activities in any future environmental reviews concerning DU. This is to ensure that we are provided the most up-to-date information regarding DU. We would encourage all parties to make available internal data on DU and fire that they may have in order for us to make the most informed decision possible.

4. Comment noted. For the reasons explained in 1-3 above and given no new data presented we have not changed our proposed burn boundaries to exclude the DU area.

APPENDIX L

INTRA-SERVICE
SECTION 7 CONSULTATION

INTRA-SERVICE SECTION 7 EVALUATION FORM

Originating Person: Steve Miller
Telephone Number: (812) 273-0783
Date: January 25, 2001

I. Region: 3

II. Service Activity: Refuges and Wildlife

III. A. Listed species and/or their critical habitat.
Indiana bat (*Myotis sodalis*). No critical habitat.
bald eagle (*Haliaeetus leucocephalus*). No critical habitat.

B. Proposed species and/or proposed critical habitat. NOT APPLICABLE

C. Category 1 candidate species. NOT APPLICABLE

D. Include species/habitat occurrence on a map. All forested and palustrine areas shown on the vegetation map (Figure 2) may provide summer habitat for *M. sodalis* and suitable habitat for *H. leucocephalus*.

IV. Geographic area or station name and action. Big Oaks National Wildlife Refuge (NWR), Madison, Indiana. This consultation is in support of the Proposed Action identified within the Environmental Assessment (EA) (Appendix K) for the Fire Management Plan at Big Oaks NWR.

V. Location:

A. County and State: Jefferson, Ripley and Jennings Counties, Indiana (Figure 1).

B. Section, township, and range: All or portions of :
T7N R9E SEC 24 and 25;
T7N R10E SEC 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 26, 27, 28, 29, 30, 31, 32, 33, 34 and 35
T6N R10E SEC 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 26, 27, 28, 29, 30 and 31
T5N R10E SEC 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 26, 27, 28, 29, 30, 31, 32, 33, 34 and 35

C. Distance (miles) and direction to nearest town: Holton is 1 mile north and Madison is 4 miles south of the Refuge.

VI. Action objectives:

This proposal entails adopting the Proposed Action as outlined within the EA prepared for the Fire Management Plan for Big Oaks NWR. The Fire Management Plan will be used to guide future fire suppression and prescribed fire management efforts at Big Oaks NWR. Following the completion of this consultation and based on the evaluation of public comments on the EA, the Regional Director (Region 3) of the Fish and Wildlife Service may make a Finding on No Significant Impact (FONSI) determination and adopt the Proposed Action. The Regional Director may also select one of the other alternatives as presented in the EA or to select an entirely new alternative that was not developed for the EA. Should an Alternative other than the Proposed Action be selected a new consultation would be required.

VII. Determination of effects:

A. Explanation of impacts of action on listed species/critical habitat

1. *M. sodalis* at Big Oaks National Wildlife Refuge

The U.S. Fish and Wildlife Service (Service), Bloomington Field Office, surveyed bats on what was the Jefferson Proving Ground and is now Big Oaks NWR during the summers of 1993, 1994 and 1995. In 1998, 1999 and 2000, bat surveys were conducted by Service staff stationed at Big Oaks NWR. Documenting the presence or absence of populations of Indiana bats was the primary objective of our survey efforts from 1993-1995 and 1998-2000. Twenty sites were surveyed during the 6-year period throughout the 50,000 acre Refuge (Figure 9).

A total of 626 individuals representing 7 species of bats, including Indiana bats, was captured on Big Oaks NWR during the 6-year survey. Sites at which Indiana bats were captured were distributed throughout the Refuge.

At Big Oaks NWR, 27 of 35 Indiana bats captured were adult females or juveniles, and the remaining 8 were adult males. We estimate that Big Oaks NWR supports a minimum of 6 Indiana bat maternity colonies; colonies are distributed across the Refuge. This is a conservative estimate; additional mist netting would likely yield evidence of additional maternity colonies.

Indiana bats were captured at 50% of the sites sampled on Big Oaks NWR at a rate of 0.19 Indiana bats per net night. Brack (1983) captured Indiana bats at 33% of riparian sites sampled at a rate of .36 bats/net night during 3 years of mistnetting in Indiana. Whitaker (1994) captured 1 Indiana bat in 10 net nights (1 net night at each of 10 different sites) in Jennings County. Capture rates can not be used to estimate population size. However, the capture rates and the fact that captures were well distributed across the property suggests that Big Oaks NWR provides a concentration of suitable Indiana bat summer habitat.

Fourteen adult Indiana bats were fitted with radio transmitters during the 6-year study period. Radio-tagged bats included 10 reproductive females, 3 nonreproductive female, and a male. Roost locations of radio-tagged bats were determined to the extent feasible; some were located in restricted areas or never located. We were able to identify 10 roost trees (for the other bats, we were only able to determine a general roost tree location or they were never relocated). Roost trees identified on Big Oaks NWR included 2 black locusts (dead), 4 American elms (dead), 3 shagbark hickories (live), and 1 red maple (dead).

Indiana bat roosts are ephemeral, frequently associated with dead or dying trees. Most roost trees may be habitable for only 2-8 years (depending on the species and condition of the roost tree) under natural conditions. Gardner et al. (1991) evaluated 39 roost trees and found that 31% were no longer suitable the following summer, and 33% of those remaining were unavailable by the second summer. A variety of suitable roosts are needed within a colony's traditional summer range for the colony to continue to exist (Kurta et al. 1993). Bats move among roosts within a season and when a particular roost becomes unavailable from one year to the next. It is not known how many alternate roosts must be available to assure retention of a colony within a particular area.

Callahan (1993) noted: "Larger forest tracts probably increase the chances that a suitable range of roost trees will be present in the stand. Large forest components also provide an additional benefit to a philopatric species that uses an ephemeral resource (snags) for roosting." Kurta et al. (1996) noted that a relatively large area is needed to meet the roosting requirements of Indiana bats; young, highly fragmented forests, typical in the midwestern United States, can not meet these requirements. Big Oaks NWR is the largest forested block available to Indiana bats over a large geographic area. The availability of roost trees on Big Oaks NWR was not quantitatively evaluated. However, based on visual inspection, most areas of Big Oaks NWR appear to provide a good supply of potential roost trees. In the immediate area of all of the roost trees which were identified, there were numerous potential alternate roost trees.

Impacts of the Fire Management Plan Proposed Action on *M. sodalis* at Big Oaks NWR

Based upon 1997 aerial photo data, there are 34,000 acres of total forested area on Big Oaks NWR. It is anticipated that implementation of the Fire Management Plan will not negatively impact the relative abundance of forests on the Refuge. The establishment of the refuge combined with implementation of the proposed FMP is likely to increase areas of interior forest. Wildland or management ignited prescribed fires will most likely burn some understory vegetation, but it is not expected to be intense enough to kill overstory trees. Due to the presence of unexploded ordnance within the burn units, we are unable to control fire spread to forested habitats within individual areas. We are also unable to evaluate fuel levels adjacent to and within forested areas to determine the likelihood of spread into these areas. Suppression efforts, if any are required, would confine or contain a wildland or management ignited

prescribed fire to a designated unit through the use of natural (e.g. creeks) and man-made (e.g. roads) features.

Implementation of the Proposed Action is not likely to adversely affect *M. sodalis*. Of the 10 Indiana bat roost tree locations which were identified on Big Oaks NWR, 4 were in areas which have been repeatedly burned by the Army. Although detailed fire histories of these areas are not available, we do know that most areas of the Refuge have been repeatedly burned by the Army since 1980 and it is likely that these areas have been periodically burned for several decades. Through radio telemetry we discovered 2 roost trees used by an Indiana bat maternity colony in July 1998 that were within an area burned in March 1998. We conclude that the burning of these areas did not destroy Indiana bat roosting habitat.

Conditions for roosting and foraging bats may be enhanced by periodic fires. The forested stands on Big Oaks NWR which have been periodically burned are typically characterized by an open understory. Forest stands with a closed canopy and open understory are considered favorable for Indiana bat foraging habitat. Some of these burned areas also tend to have large, widely scattered trees, a condition which may be conducive to the development of roost trees. Callahan (1993) found that most primary roosts were snags in open-canopy situations.

2. *H. leucocephalus* at Big Oaks National Wildlife Refuge

Based upon 1997 aerial photo data, there are 34,000 acres of total forested area on Big Oaks NWR. It is anticipated that implementation of the Fire Management Plan will not negatively impact the relative abundance of forests on the Refuge. The establishment of the refuge combined with implementation of the proposed FMP is likely to increase areas of interior forest over time. Wildland or management ignited prescribed fires in forested areas will most likely burn some understory vegetation, but it is not expected to be intense enough to kill overstory trees. Due to the presence of unexploded ordnance within the burn units, we are unable to control fire spread within forested habitats. We are also unable to evaluate fuel levels adjacent to and within forested areas to determine the likelihood of spread into these areas. Suppression efforts, if any are required, would confine or contain a wildland or management ignited prescribed fire to a designated unit through the use of natural (e.g. creeks) and man-made (e.g. roads) features.

No surveys have been conducted specifically for *H. leucocephalus* on Big Oaks NWR. The Refuge is outside of the State of Indiana's annual *H. leucocephalus* aerial survey area. The Refuge staff have reported the presence of *H. leucocephalus* at Old Timbers Lake during winter periods when the lake was ice-free (1998 and 1999) and along an ice-free stream during late-winter periods (1999). All sightings have been of immature birds. No adult *H. leucocephalus* have been observed nor have any *H. leucocephalus* been observed during the

nesting period or exhibiting nesting behavior. No impact is anticipated on *H. leucocephalus* with adoption of the Proposed Action.

B. Explanation of impacts of action on proposed species/critical habitat. NOT APPLICABLE

C. Explanation of actions to be implemented to reduce adverse effects

1) No prescribed burns will be conducted during the period when Indiana bats are known to occupy Big Oaks NWR (April 15 - September 15) without conducting an individual section 7 consultation for each burn.

2) The Ecological Services office in Bloomington, IN will be notified prior to management ignited prescribed fires occurring at Big Oaks NWR.

3) All wildland fires will be suppressed from April 15 to September 15 to avoid direct mortality to bats.

4) The option to allow naturally ignited wildland fires to burn outside of the April 15 - September 15 period will only be considered after notifying the Ecological Services office in Bloomington.

VIII. Effect determination and response requested.

A. Listed species/critical habitat

Indiana bat (Myotis sodalis)

Determination	Response
___ no effect	___ concurrence
___ beneficial effect	___ concurrence
_X_ is not likely to adversely affect	_✓_ concurrence
___ is likely to adversely affect	___ formal consultation

bald eagle (*Haliaeetus leucocephalus*)

Determination	Response
_X_ no effect	✓ concurrence
___ beneficial effect	___ concurrence
___ is not likely to adversely affect	___ concurrence
___ is likely to adversely affect	___ formal consultation

B. Proposed species/proposed critical habitat: NOT APPLICABLE

Project Leader:

Lee Herzberger Date: 2-23-01

Lee Herzberger

IX. Field Office evaluation.

A. Concur ✓ Do not concur _____

B. Comments:

Field Supervisor:

Scott Pruitt Date: 2/28/01

Scott Pruitt

APPENDIX M

BIBLIOGRAPHY

APPENDIX M

BIBLIOGRAPHY

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APPENDIX M

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APPENDIX N

NEPA COMPLIANCE

Facility: Big Oaks National Wildlife Refuge
Title: Fire Management Plan Environmental Assessment

FINDING OF NO SIGNIFICANT IMPACT

For the reasons briefly presented below and based on an evaluation of the information contained in the supporting references enumerated below, I have determined that the implementation of the management ignited prescribed fire and wildland fire suppression program as described in Alternative A in the Environmental Assessment of the Fire Management Plan for Big Oaks National Wildlife Refuge, is not a major Federal action which would significantly affect the quality of the human environment within the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969. An Environmental Impact Statement will, accordingly, not be prepared.

Reasons:

1 Protection of life and property through wildfire suppression is critical and is the main focus of this fire management plan.

2. Reduction of fuels through prescribed burning will greatly reduce the number or severity of wildland fires thereby reducing the risk to life and property.

3. Maintenance of grasslands and other early successional habitats through prescribed fire will greatly benefit several Service trust species that are declining region wide.

Mitigating Measures:

In order to avoid impacts to the Indiana bat (*Myotis sodalis*), a Federally endangered species, no prescribed burning will be conducted between the dates of April 15 and September 15.

2. In order to minimize impacts to the *M. sodalis*, all wildland fires occurring between April 15 and September 15 will be suppressed in a manner that minimizes the size of the wildand fire while recognizing the unique safety hazards associated with suppression in an area containing unexploded ordnance and other contaminants.

3. Unexploded ordnance hazard zones will be established by the refuge manager, wildland fire incident commander or prescribed fire burn boss for all fires occurring on the refuge. These zones will be based on the potential fragmentation range of ordnance as advised by the U.S. Army. All access within this zone is prohibited except by authorization of the refuge manager, wildland fire incident commander or prescribed fire burn boss.

4. A review of this plan will be conducted annually to determine if burning within areas of the refuge that contain contaminants including depleted uranium, resulting from past Army

use, pose a risk to the public, fire management personnel, or the environment. No prescribed fires are planned to occur in areas containing depleted uranium during the current fire management year (2001).

5. No impacts to cultural resources are anticipated by this action.

Supporting References:

1. Environmental Assessment Checklist
2. Environmental Assessment
3. Section 7 Consultation
4. Fire Management Plan

Regional Director, FWS, Region 3

Date: 3/02/01

Distribution:
Wash., DC (OEC)
State Clearinghouse